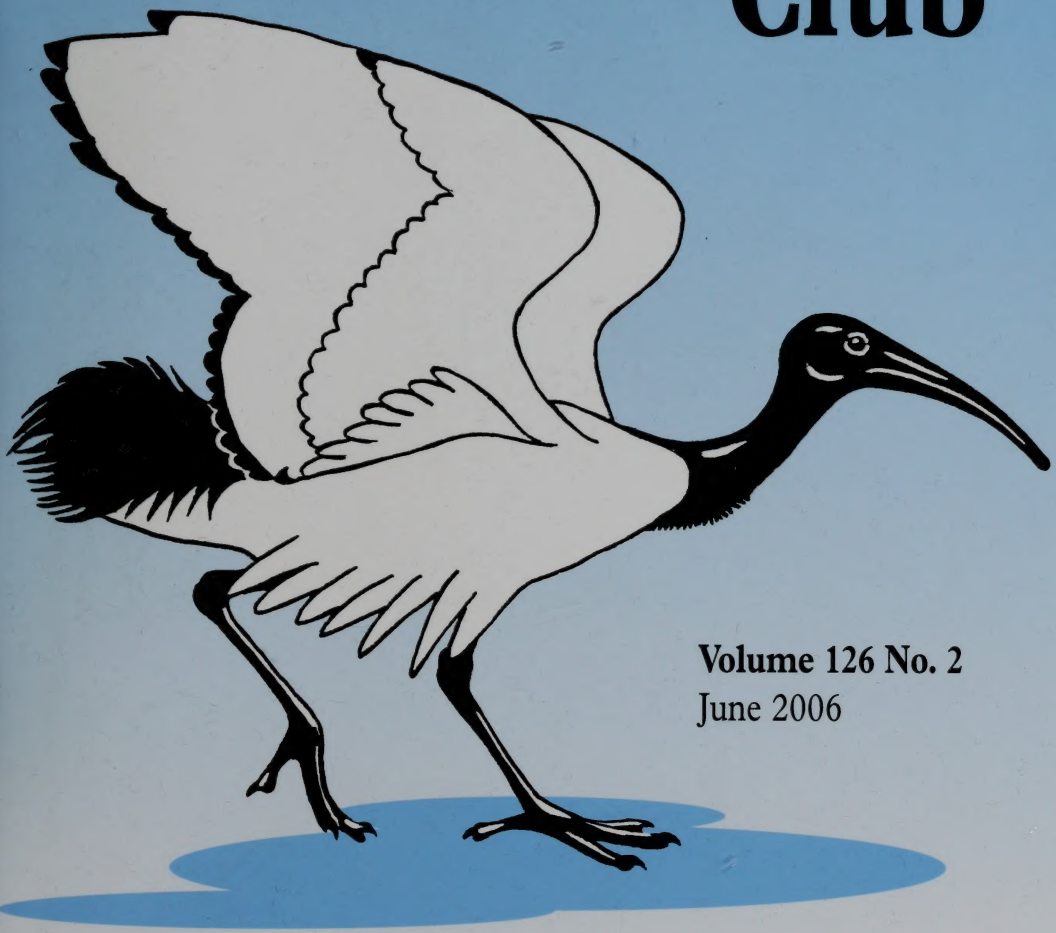
Bulletin of the British Ornithologists' Club



Volume 126 No. 2
June 2006

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MEETINGS are normally held in the **Sherfield Building** of **Imperial College**, South Kensington, London SW7. The nearest Tube station is at South Kensington; a map of the area will be sent to members, on request. (Limited car parking facilities can be reserved [at a special reduced charge of **£5.00**], on prior application to the Hon. Secretary.)

The cash bar is open from **6.15 pm**, and a buffet supper, of two courses followed by coffee, is served at **7.00 pm.** (A vegetarian menu can be arranged if ordered at the time of booking.) Informal talks are given on completion, commencing at about 8.00 pm.

Dinner charges are **£21.00** per person as from **1 January 2006.**

FORTHCOMING MEETINGS

See also BOC website: **http://www.boc-online.org**

26 September 2006—Please note that the proposed talk for this date (Lars Svensson—*The Almaty skin collection and the birds of Kazakhstan*) has been cancelled. An alternative speaker or programme of short talks will be substituted as soon as possible. It is hoped that the revised programme can be announced at the June meeting and also be published in the September issue of the Bulletin scheduled for dispatch on 12 September. Under these circumstances, notice to attend the September meeting will be accepted up to one week in advance (see below).

*Applications to Hon. Secretary (address below) by **17 September** please*

7 November 2006—Edward C. Dickinson—*Avian nomenclature and the ICZN Code: a layman's view.* Edward Dickinson is probably best known as the editor of *The Howard & Moore complete checklist of birds of the world*, third edition (2003). The talk will examine some of the ambiguities and difficulties that affect decisions on authorship and on the dating of bird names, and open up discussion of changes that are or may be under consideration.

*Applications to Hon. Secretary (address below) by **24 October***

5 December 2006—Prof. Jeremy Greenwood—*The future of birds and Man.* Jeremy Greenwood has been Director of the British Trust for Ornithology since 1988. He has worked on genetics, behaviour, ecology and biogeography of snails and various birds, particularly Guillemots *Uria aalge*, Snow Buntings *Plectrophenax nivalis* and Blue Tits *Parus caeruleus*. Starting from an ornithological base, Jeremy will consider the prospects facing mankind and the environment from the viewpoint of ecological science.

*Applications to Hon. Secretary (address below) by **14 November***

Overseas Members visiting Britain are especially welcome at these meetings, and the Hon. Secretary would be very pleased to hear from anyone who can offer to talk to the Club giving as much advance notice as possible—please contact: S. A. H. (Tony) Statham, Ashlyns Lodge, Chesham Road, Berkhamsted, Herts. HP4 2ST, UK. Tel. 01442 876995 (or e-mail: boc.sec@bou.org.uk).

Bulletin of the BRITISH ORNITHOLOGISTS' CLUB

Vol. 126 No. 2 Published 5 June 2006

CLUB ANNOUNCEMENTS

Members are reminded that subscriptions for 2006 fell due on 1 January. Details for membership correspondence, subscriptions and applications can be found on the inside back cover. All such issues should now be addressed to the BOC Office, P.O. Box 417, Peterborough PE7 3FX, e-mail: boc.office@bou.org.uk

Correspondence on all general Club matters should continue to be addressed to: Hon, Secretary, S. A. H. (Tony) Statham, Ashlyns Lodge, Chesham Road, Berkhamsted, Herts. HP4 2ST, e-mail: boc.sec@bou.org.uk

Congratulations to Peter Tate on achieving 50 consecutive years (1956–2006) membership, who therefore becomes a Hon. Life Member. We are grateful for his 12-year service as *Hon. Treasurer* (1962–74).

Committee is pleased to welcome the following new members who were formally elected at the meeting held on 25 April: J. del Hoyo (Spain), J. L. Garrett (USA), M. Lentino (Venezuela), S. Peters (UK), B. O'Brien (UK) and Dr R. Winkler (Switzerland)

The 935th meeting of the Club was held on Tuesday 24 January 2006, in the Sherfield Building Annexe, Imperial College, London. Seventeen members and nine guests were present.

Members attending were: Cdr. M. B. CASEMENT, RN (*Chairman*), Miss H. BAKER, D. R. CALDER, S. E. CHAPMAN, Prof. R. A. CHEKE, Dr J. COOPER, J. B. FISHER, Revd. T. W. GLADWIN, D. GRIFFIN, Dr J. P. HUME, Dr C. F. MANN, D. J. MONTIER, P. J. SELLAR, S. A. H. STATHAM, C. W. R. STOREY, Cdr. F. S. WARD, RN, and P. J. WILKINSON

Guests attending were: Mrs J. CALDER, Mrs C. R. CASEMENT, Mrs P. A. CHAPMAN, Field Marshal Sir JOHN CHAPPLE (*Speaker*), Vice Admiral Sir DAVID DOBSON, Mrs J. M. GLADWIN, Mrs M. MONTIER, B. O'BRIEN and Mrs J. WARD.

After dinner, Sir John Chapple presented his *Reminiscences of a nature conservationist,* a summary of how birds have influenced his life with examples of how he has repaid the 'debt'. His earliest experiences of being shown nests of Spotted Flycatcher *Muscicapa striata* and Chiffchaff *Phylloscopus collybita* hooked him for life. For his ninth birthday, he received the five-volume *Handbook of British birds* (Witherby *et al.*), and after the war, aged 16, he participated in an expedition to Newfoundland. Before the expedition, he spent time at the Natural History Museum in South Kensington learning skinning and preservation techniques. Sir John was made a Fellow of the Zoological Society of London and the Royal Geographic Society whilst still a teenager and turned these into life memberships as soon as he could afford to do so. Much later, he became President of the former (1992–95) and a Council Member of the latter (1980–2000). His extensive military and diplomatic career also led to memberships of numerous ornithological and conservation-minded organisations, giving him the opportunity to see many of the world's rare species including the Pink-headed Duck *Rhodonessa caryophyllacea* at Alfred Ezra's Foxwarren Park in Surrey.

Sometimes when visiting overseas military colleagues, Sir John's interest in ornithology was met with bewilderment. Some armies would regard this weird hobby as an automatic bar to promotion and in a military context such interests could be frustrating, such as being on patrol in Borneo with 100 soldiers and trying to stop the whole company for a special bird. Conversely it always seemed that one might hear a tantalising new species when waiting in ambush, but be unable to get close enough to identify it.

Sir John's tenure in Hong Kong began in the late 1950s when the New Territories were very rural. Old villages were distinct entities surrounded by paddyfields. Much of the environment was man-made and uncontrolled shooting, trapping and netting were also widespread. Despite the enormous changes in agriculture that developed from the 1960s, a few people persuaded the local District Officer that Mai Po marsh should be made a conservation area. The border fencing to control illegal immigrants and the constant military presence to enforce law and order actually helped protect the area. The founding of the Hong Kong chapter of the World Wildlife Fund provided a substantial boost post-1980 and today the reserve is well supported and attracts many visitors.

Sir John concluded with an outline of the work to establish a captive-breeding programme for three *Gyps* species of vultures in Nepal. Populations have been decimated by the use of Diclofenac as a pain reliever for cattle. Several organisations are taking the lead on this project, including the King Mahendra Trust and, whilst bureaucracy has frustrated preliminary efforts, progress is being made. Diclofenac has now been banned in both India and Nepal, and a substitute drug (Meloxican), regarded as harmless to vultures, is being introduced.

The 936th meeting of the Club was held on Tuesday 14 March 2006, in the Sherfield Building Annexe, Imperial College, London. Nineteen members and seven guests were present.

Members attending were: Cdr. M. B. CASEMENT, RN (*Chairman*), Miss H. BAKER, Prof. R. A. CHEKE, Ms K. COOK, Dr J. COOPER, J. B. FISHER, F. M. GAUNTLETT, A. GIBBS, D. GRIFFIN, R. H. KETTLE, R. R. LANGLEY, Dr C. F. MANN, D. J. MONTIER, P. J. OLIVER, R. C. PRICE, Dr R. P. PRŶS-JONES, P. J. SELLAR, S. A. H. STATHAM and P. J. WILKINSON.

Guests attending were: Mrs C. R. CASEMENT, Mrs B. FISHER, Mrs M. H. GAUNTLETT, Mrs M. MONTIER, R. PERRON (*Speaker*), Dr S. TURVEY and Mrs S. VOGEL.

After dinner, Richard Perron talked on *The phantoms of the rainforest—the genus Casuarius.* The genus *Casuarius* comprises three extant species, which, although very similar, can readily be separated by the number of wattles on the foreneck, the size and shape of the casque on the head and distinctive colouring on the throat, shoulders and neck. Cassowaries are ratites, related to ostriches, rheas, kiwis and emus. They, along with the extinct elephant birds and moas, share a common flying ancestor which lived *c.*100 MYA and have reached their present locations through continental drift. Cassowaries range through dense forests of north-east Queensland, New Guinea and several nearby large islands, including New Britain and Seram, where populations of *C. bennetti* and *C. casuarius,* respectively, have been introduced by man, albeit probably hundreds of years ago. Adults are uniformly black with double feathers like their closest relative, emus. They are flightless, but have a remnant wing with six shafts, popularly used by New Guinea tribesmen as nose decoration. They are very shy, but can be very dangerous and have killed humans. The male alone incubates the 3–5 eggs for *c.*54 days, neither drinking nor eating during this period. Young are precocial and brown with dark parallel longitudinal stripes on the back. They stay with the male until sexual maturity at *c.*18 months, when they establish their own territories. Females are normally larger than males and adults can reach 1.8 m tall and weigh 55 kg. Cassowaries feed on forest fruits, but also take insects and small animals. Aboriginal life in Queensland and New Guinea is inseparably intertwined with the cassowary, which forms part of religious, cultural and economic affairs. With no natural enemies, cassowaries are threatened by deforestation, introduced species and overhunting, though efforts in Queensland are underway to protect them. There are *c.*600 cassowaries in captivity worldwide, almost all of them *C. casuarius,* but there is no realistic captive-breeding programme.

Revd. Geoffrey K. McCulloch, OBE

It is with great regret, we report Geoffrey's death, aged 94, on 6 November 2004. A member of the Club since 1944, he became a Hon. Life Member in 1994. Born in the Wirral, he moved to Northwood, Middlesex, in 1931. He was called to the Bar in 1935 and shortly after the outbreak of war was commissioned into the Rifle Brigade. In 1943 he was seconded to the Army Legal Services, travelling widely around Europe in the aftermath of the war. He was partly responsible for re-writing the Manual of Military Law and was awarded the OBE in 1957. In 1962 he retired, with the rank of Colonel, to begin

training for the Church of England. Ordained in 1964, he became Vicar of St Matthew with St Barnabas, Hull. On his retirement in 1979, he returned to Northwood, where he remained active as a Hon. Member of Staff at Emmanuel Church, and was a regular at Club dinners. He served on the Committee 1981–83, as *Vice-Chairman* 1983–86 and finally as *Chairman* 1986–89.

Geoffrey's passion for ornithology began in the Wirral and he could fondly remember the exact spot he had found his very first nest! He pursued this interest throughout his period in the army. During his time in Egypt, in the early 1950s, he and a colleague were once looking for nests opposite the commander-in-chief's residence. A guardsman on sentry duty, who was obviously bored, presented arms every time Geoffrey appeared out of a ditch or hollow—often several times a minute! Whether abroad or at home, Geoffrey had his binoculars always to hand. He was married to Isabel for 55 years and they had two children.

Michael Casement

ANNUAL GENERAL MEETING 2006

1. The Annual General Meeting of the British Ornithologists' Club was held in the Sherfield Building Annexe, Imperial College, London SW7, on Tuesday 25 April 2006 at 6 pm with Cdr. M. B. Casement OBE, RN, in the Chair. Seventeen members were present (including six from the committee) and apologies were received from: I. R. Bishop, R. J. Dowsett, S. P. Dudley, J. B. Fisher, S. Lowe and P. Sellar. The Minutes of the 2005 Annual General Meeting held on 26 April 2005, which had been published (*Bull. Brit. Orn. Cl.* 125: 82–84), were approved and signed by the Chairman.

2. Chairman's report. This is my first report, as your Chairman, but I propose to be very brief, because most of the points are already covered in the Trustees' Annual Report, and will be covered in more detail by David Montier, Guy Kirwan and Tom Gladwin, under the appropriate items to follow. My thanks are due to each of them for their key roles in managing our affairs, and also to Tony Statham who has done a splendid job in continuing the tasks he inherited from me as Hon. Secretary. In summary, it has been a busy year behind the scenes and on completion of the increased subscription renewals, as from 1 January 2005, responsibility for all membership matters was transferred from myself to Steve Dudley in July. Steve Dudley also took over responsibility from Paul Salaman for the management of the website; some improvements have been made, including facilities for online payments, and others are planned. The steady and continuing small decline in membership is a matter of concern, but is similar to other comparable organisations. One regrettable casualty of these changes is that we can no longer produce the annual list of members. Members seeking contact details and address changes of other members should contact Steve Dudley, direct.

As you will see in the report, our financial affairs are in a very healthy state, largely thanks to the expert management of our Hon. Treasurer, and also through a welcome rise in the stock market. We again held seven evening meetings, on a wide range of subjects, and a similar programme is planned for 2006. Our thanks are due to Imperial College for their excellent administrative support and, despite the annual rise in dinner charges, for continuing to allow us very favourable rates. The Club's projector has been put to good use throughout the year, and we are grateful to Pat Sellar and Ron Kettle for their technical skills with the sound equipment.

The BOC–BOU Joint Publications Committee (JPC), under the chairmanship of Tom Gladwin, has made continuing progress, the highlight of which was the publication of the *Bird Atlas of Uganda.* Bob Cheke has filled the vacancy left by the late Janet Kear, as Commissioning Editor of the publications in the Checklist series.

As Guy Kirwan will report, the Bulletin has been maintained at its usual high standard. Our thanks are due to Mary Muller for continuing to produce the annual index; she has now done this for more years than I can remember, and has asked to be relieved of this task—action is in hand to seek her replacement. The most important step has been, as announced in *Bull Brit. Orn. Cl.* 126: 1, the establishment of a Bulletin Subcommittee, under the chairmanship of Prof. Chris Feare, with terms of reference to develop and recommend policies for all aspects of the management of the Bulletin. High on their agenda is to

investigate the practicalities of producing an online version. The subcommittee is due to meet on Wednesday 3 May.

Your Committee is also looking at a long-term 'Vision for the Future' and the Bulletin Subcommittee's recommendations will be a major contribution to this study. I shall give a brief explanation of this later this evening. This time next year, we may well have some fairly major recommendations and changes to place before you.

3. Trustees Annual Report. The Chairman advised the meeting that the Trustees Annual Report and Annual Accounts were again combined in the handout available to those attending the meeting and confirmed that these would also be published in the June issue of the Bulletin. The Hon. Treasurer drew attention to the income and expenditure details shown on pp.8–9 of the accounts and summarised the balance sheet shown on p.7. The Chairman thanked the Hon. Treasurer for his support and seconded his proposal that the accounts should be formally accepted; all those present agreed.

A brief overview was also given for the Barrington Fund whose assets stood at £1,162 as of 31 December 2005. The Hon. Treasurer proposed that this balance should be transferred to general funds, which was seconded by the Chairman and agreed unanimously by those present.

4. The Bulletin. Some 43 papers were published as part of Vol. 125, including type descriptions of two new taxa. The interval between receipt and publication was 6–18 months, averaging *c.* 12 months, a slight improvement on most recent years, although it is hoped to reduce 'waiting time' slightly further. During the final part of the year, work was progressed towards publication of the Recent Avian Extinctions conference proceedings, which will be published as a Supplement, timed to appear with the June 2006 issue of the *Bulletin.* The Hon Editor thanked Eng-Li Green, of Alcedo Publishing, Mike Dawson and Crowes, Mary Muller, Tony Statham and staff at the Natural History Museum, Tring, for their assistance.

5. Publications report. Revd. Tom Gladwin, Chairman of the Joint Publications Committee (JPC), drew attention to the relevant section in the Trustees Annual Report and confirmed that the publication of *The Birds of São Tomé and Príncipe with Annobón* was imminent. Future publications planned for 2006 include *The Birds of Borneo* and *The Birds of Barbados,* and both manuscripts are now with Commissioning Editor Prof. Bob Cheke. The JPC is seeking advice in order to make recommendations that authors should follow an established and authorised taxonomic system or otherwise with the JPC's consent. Some research is also being undertaken to explore online printing and printing on demand.

6. Election of Officers and Committee. The Chairman said that the election of Officers was as proposed in the agenda as published in *Bull. Brit. Orn. Cl.* 126: 1.

Mr S. A. H. Statham be re-elected as *Hon. Secretary.*

Mr D. J. Montier be re-elected as *Hon. Treasurer.*

No other changes to the Committee are proposed, as all other members are eligible to serve at least one more year in office.

The following *ex-officio* members were confirmed in continuation:

Revd. T. W. Gladwin (*Chairman Joint Publications Committee*)

Prof. R. A. Cheke (*Hon. Publications Officer*)

S. P. Dudley (*Hon. Website Manager*)

G. M. Kirwan (*Hon. Editor*)

Prof. C. J. Feare (*Chairman Bulletin Subcommittee*)

7. Any Other Business. The Chairman advised that the Hon. Secretary (Tony Statham) had received a note from F. M. Gauntlett (FMG) expressing concern about an article in *Bull. Brit. Orn. Cl.* 125 (3) (Robbins, M. B. & Zimmer, K. J. Taxonomy, vocalisations and natural history of *Philydor dimidiatum* (Furnariidae), with comments on the systematics of *Syndactyla* and *Simoxenops*). FMG stated that the article implied that the Club condoned the collection of specimens by the authors in a national park without having the relevant permit(s). The Chairman said that the Committee had already discussed this

matter and that the Hon. Editor (G. M. Kirwan) had corresponded with FMG. It was agreed that future articles should confirm that the necessary permit(s) had been obtained; it was noted that a similar policy was adopted for articles in *Ibis*.

The meeting closed at 6.45 pm.

BRITISH ORNITHOLOGISTS' CLUB
Founded 5 October 1892
Registered Charity No. 279583

TRUSTEES' ANNUAL REPORT FOR 2005

List of Trustees—Committee

Cdr. M.B. CASEMENT, OBE, RN *Chairman* (2005)
Miss H. BAKER *Vice-Chairman* (2005)
S. A. H. STATHAM *Hon. Secretary* (2004)
D. J. MONTIER *Hon. Treasurer* (1997)
I. R. BISHOP, OBE (2003)
Dr J. H COOPER (2005)
Dr J. P. HUME (2004)
C. W. R. STOREY (2003)
P. J. WILKINSON (2005)
Ex-officio Revd. T. W. GLADWIN *Chairman* JPC (2002).

Correspondence and enquiries to the Hon. Secretary, Ashlyns Lodge, Chesham Road, Berkhamsted, Herts. HP4 2ST
Auditors and Independent Examiners Porritt Rainey, 9 Pembroke Road, Sevenoaks, Kent, TN13 1XR
Bankers Barclays Bank plc, Dale House, Wavertree Boulevard, Liverpool, L7 9PQ

Constitution

The British Ornithologists' Club was founded in October 1892. It currently operates under Rules revised in 2000 and approved at a Special General Meeting on 31 October of that year. Members of the Committee, who are also the Trustees of the Club, are listed above with the dates of their appointment. Committee members are elected for a term of four years, with the exception of the Hon. Secretary and Hon. Treasurer, who are both subject to re-election at each Annual General Meeting.

Objects of the Charity

The promotion of scientific discussion between Members of the British Ornithologists' Union (BOU) and others interested in ornithology, and to facilitate the dissemination of scientific information concerned with ornithology, with a particular emphasis on avian systematics, taxonomy and distribution.

The Committee

The Committee met six times during the year. At the AGM on 26 April Michael Casement was appointed Chairman in succession to Dr Clive Mann and agreed to remain Membership Secretary until this position was handed over to Steve Dudley, the BOU Administrator, under the terms of a joint administration agreement between the Club and the BOU. This took effect from 1 August but the subscription management of BOC Institutional Subscribers and sales of BOC publications commenced from 1 January. Other appointments at the AGM included Helen Baker as Vice-Chairman (*vice* Michael Casement) and Dr Joanne Cooper and Peter Wilkinson in succession to Dr Paul Salaman and Prof. Bob Cheke, who remains Hon. Publications Officer. To assist them in understanding their responsibilities as Trustees, all Committee members have been provided with a copy of two booklets issued by the Charity Commissioners outlining matters of which Trustees need to be aware.

Dr Paul Salaman, Hon. Website Manager, continued to maintain the BOC website until August when this responsibility was also handed over to Steve Dudley under the joint administration agreement with the BOU. Steve Gregory, Paul Salaman and Alistair Carr continued to progress the project for the electronic archiving and marketing of the complete set of the Bulletin.

The Committee continues to be most grateful to the Trustees of the Herbert Stevens Trust Fund (Nigel Crocker, Peter Oliver and Richard Price) for their time and expertise advising on the performance of the Fund.

Meetings

The number of evening meetings held at Imperial College, London, was maintained at seven in 2005. A total of 196 (151 members and 45 guests) attended these meetings, which represented an average attendance of 28. The programme of speakers during the year again covered a wide variety of ornithological subjects, including the songs of North American sparrows and warblers, the use of shade by birds in hot climates, a collection of mummified birds in the Natural History Museum, the spread of the House Crow *Corvus splendens,* ship-based observations of seabird and landbird migration in the eastern Atlantic, and the parrots of the Mascarenes. As in previous years, the 26 April meeting following the AGM took the form of a social evening, during which informal short talks and brief discussions were contributed by nine participants on a range of subjects from individual species to Lord Rothschild's 1905 Red List of extinct and endangered species, and an overview of the Royal Naval Birdwatching Society database. Summaries of these talks are to be found in the Club Announcements section of the Bulletin. Unfortunately, Imperial College increased their catering and venue charges again for 2005 requiring an increase in the cost of Club dinners to £20 per head.

The Bulletin

Vol. 125 contained 320 pages and the 43 papers covered a broad geographical spread with a strong accent on the Neotropics and Afrotropics. Although only two new taxa were described, a new species of *Scytalopus* tapaculo from Colombia and a new subspecies of *Sylvia* warbler from north-west Africa, the traditional Bulletin topics of taxonomy and nomenclature remained well represented, with a particularly comprehensive contribution on the nomenclature of Eduard Rüppell's types from north-east Africa and several new generic designations being highlights. For papers published in 2005, the interval between receipt and publication was 6–18 months, averaging *c.*12 months, which is a reasonable improvement on most recent years, although it is hoped to reduce 'waiting time' slightly further. The Hon. Editor is working on this issue as a medium-term objective. The Bulletin retains its popularity, with a total of 52 new manuscripts being received in 2005. Of these, 16 were rejected, and the remainder are still being refereed.

Grateful thanks, as always, to referees who have given freely of their time and expertise, and to Eng-Li Green, of Alcedo Publishing, and Mike Dawson and team, of Crowes (our printers), for their support and efficiency. Thanks are also due to Mary Muller who produced the index. Tony Statham produced the cover information and Club Announcements, and staff at the Natural History Museum, Tring, proffered much-valued support to the Hon. Editor.

Bulletin—Institutional Subscriptions

Subscriptions from Institutional Subscribers during 2005 totalled 116 (105 in 2004), with 27 in the UK and 89 overseas (28 different countries). Of the latter, 38 were from North America, 30 from Europe (including Russia), eight from Australasia, five from Africa, three from Asia and one from South America.

Report of the Joint Publications Committee

The BOC–BOU Joint Publications Committee (JPC) met twice in 2005. The Chairman of the committee is alternately appointed by the BOC and BOU. Nominated this year by the BOC, Tom Gladwin will chair the committee until April 2007. Bob Cheke has filled the vacancy, left by the late Janet Kear, as Commissioning Editor for all titles for which the committee is responsible. *The Bird Atlas of Uganda* was

published during the year and several other titles progressed towards publication. In response to requested changes, the proposed checklist *The Birds of Singapore* has been withdrawn by the author.

Forthcoming Publications In the checklist series, *The Birds of São Tomé and Príncipe and Annobón* will be published early in 2006. *The Birds of Borneo* and *The Birds of Barbados* continue to progress, and a manuscript is expected on *The Birds of Crete*. Priority will be given to publishing *The Status of Birds in Britain and Ireland* by the spring of 2008 as part of the BOU's 150th anniversary celebrations. The proceedings of the conference on Recent Avian Extinctions, which will be published in *Bull. Brit. Orn. Cl.*, will appear in 2006.

Taxonomy The JPC has concerns about the liberal approach to taxonomic principles adopted by some proposed authors. It is seeking advice in order to make recommendations that authors should follow an established and authorised system, or otherwise with the JPC's prior consent.

Acknowledgements The Committee is grateful to all who have contributed to its work and especially to Bob Cheke as Commissioning Editor, and Steve Dudley for progressing and managing the titles in its charge.

Membership

Subscription rates were increased from 1 January 2005. As at 31 December 2005, there were 512 paid-up Members (539 in 2004): 273 from the UK and 239 from overseas (44 countries). Overseas members comprise Europe (104), North America (60), Australasia (23), Africa (21), Asia (17) and South America (14). The Club welcomed 12 new Members, but mourned the death of Members E. D. H. Johnson (1970–2005), K. V. Thompson (1979–2004), R. S. R Fitter (1943–2005, Committee 1959–62, *Vice-Chairman* 1962–65, *Chairman* 1965–68), and A. J. Helbig (1994–2005). Ten resignations were received plus two who gave advance notice they would not renew for 2006, and 12 were removed under Rule 24, resulting in a net decrease in membership of 27 during the year.

Finance

After a busy year for the Club, which saw the long-awaited publication of the *Bird Atlas of Uganda,* with its substantial printing costs, the Club's finances broke even in 2005. A loss of £2,584 on Unrestricted Funds was almost exactly matched by an offsetting surplus of £2,576 on Restricted Funds to give a net loss for the year of £8 before allowing for the changes in the market value of investments.

Income for the year totalled £38,471, including £12,883 from subscriptions, which benefited from the increases that applied from 1 January 2005 and a consequent increase to £758 in the amount of tax recovered from Gift Aid and Deeds of Covenant. Investment income rose by £1,195 to £17,965. Of this sum, £10,410 came from the Herbert Stevens Fund, giving a yield on the year-end market value of 4.05%. Interest on cash deposits amounted to £7,519, mostly from cash invested in charity deposit funds. Sales of BOC publications produced £1,100, with approximately half coming from sales of *Why Museums Matter,* but income from sales from BOC/BOU joint publications dropped by £2,200, as sales of previous year's Checklists declined and sales of the Uganda Atlas took off rather slowly in the second half of the year.

Total expenditure, at £38,479, was well up on the previous year. Two main items accounted for most of this increase. Final production costs of the Uganda Atlas amounted to £11,331 and have been written off in full in the year, and there was an increase of £2,400 in the management fee paid to the BOU for the services of Steve Dudley who now handles sales of publications and assumed responsibility for all subscription matters part way through the year. Bulletin costs, including the honorarium paid to the Editor, showed only a slight increase to £13,932, but still run about £1,000 ahead of subscriptions.

Investments

Stock markets continued to improve during 2005, particularly in the second half of the year. As a result, the market value of the Club's investments in charity unit trusts held in the Herbert Stevens Fund showed an increase of £28,333 by the end of the year taking the value to £256,714, an increase of 12.4% over 12 months and finally recovering from the substantial falls in 2001–02. The Barrington Trust Fund increased slightly to a year-end value of £1,162. As this now represents a very small part of the Club's finances, a

proposal will be made to the Annual General Meeting to close this fund and to transfer the money into the charity deposit account where it will earn approximately the same level of income. Total investments in the Balance Sheet are stated at £306,876, the additional £49,000 being the capital from the Clancey bequest, which continues to be held in a fixed-rate Building Society account.

Reserves

Of the Club's total resources, £20,000 remains in a Designated Unrestricted Fund towards the cost of future publications, two of which, *The Birds of Borneo* and *The Status of Birds in Britain and Ireland* are likely to be quite costly. The balance of the Uganda Atlas Fund was applied during the year against the final cost of publication and that fund is now closed. The two remaining funds, the Clancey bequest and the Publications Fund totalled £59,448 at the year-end and are held as backing for new developments for the Bulletin or additions to other Club publications, respectively. The investments that form a large part of the Unrestricted Funds built up from past legacies provide a regular source of income towards the Club's administrative expenses, whilst additional liquid funds are available to finance any future publications. This can involve substantial expenditure against a rather slow payback as expected with specialist publications that are highly valued, but fall within an inevitably limited market.

Risks

The Committee has reviewed the major risks to which the Club is exposed, particularly with regard to managing the Club's cash resources and overseeing the production of new publications within a controlled timetable. Investments are held in diversified portfolios within separately managed charity unit trusts providing an acceptable balance between security and risk. In particular, the Herbert Steven Fund is managed by three Trustees, who report regularly to the Committee. Additionally, the Joint Publications Committee considers proposals for further publications and puts forwards recommendations, bearing in mind the level of resources available.

Trustees' Responsibilities

Under the Charities Act 1993, the Trustees are required to prepare a statement of accounts for each financial year which gives a true and fair view of the state of affairs of the charity at the end of the financial year and of the incoming resources and application of resources in the year. In preparing the statement the Trustees are required to:

- Select suitable accounting policies and then apply them consistently;
- Make judgements and estimates that are reasonable and prudent;
- State whether applicable accounting standards and statements of recommended practice have been followed, subject to any material departure disclosed and explained in the statement of accounts;
- Prepare the financial accounts on the going concern basis unless it is inappropriate to presume that the charity will continue its operations.

The Trustees are responsible for keeping proper accounting records which disclose with reasonable accuracy at any time the financial position of the charity and to enable them to ensure that any statement of accounts prepared by them complies with the regulations under section 41 (1) of the Charities Act 1993. They are also responsible for safeguarding the assets of the trust and hence for taking reasonable steps for the prevention and detection of fraud and any other irregularities.

Approved and signed on behalf of the Trustees

M. B. Casement
Chairman

Date: 25 April 2006

BRITISH ORNITHOLOGISTS' CLUB

BALANCE SHEET—31 December 2005

	Notes	2005 £	2005 £	*2004* £	*2004* £
FIXED ASSETS					
Projection Equipment	2		**324**		*486*
INVESTMENTS					
At market value	3		**306,876**		*278,384*
CURRENT ASSETS					
Stock of publications		**100**		*100*	
Cash at bank and in hand		**5,285**		*4,404*	
Cash on deposit		**108,980**		*109,828*	
Prepayments		**375**		*363*	
Other debtors		**1,707**		*1,692*	
		116,447		*116,387*	
CURRENT LIABILITIES					
Subscriptions in advance		**(4,848)**		*(4,142)*	
Creditors falling due within one year		**(2,878)**		*(3,678)*	
			108,721		*108,567*
TOTAL ASSETS			**415,921**		*387,437*
FUNDS					
Unrestricted					
Designated	4		**20,000**		*20,000*
Other	5		**336,473**		*310,565*
			356,473		*330,565*
Restricted	6		**59,448**		*56,872*
			415,921		*387,437*

Approved and Signed on behalf of the Trustees
M B Casement
Chairman Date: 25 April 2006

STATEMENT OF FINANCIAL ACTIVITIES—31 December 2005

	2005 Unrestricted £	2005 Restricted £	2005 Total £	*2004 Total £*
INCOMING RESOURCES				
SUBSCRIPTIONS				
Members	**9,474**	—	**9,474**	*6,970*
Institutional subscribers	**2,651**	—	**2,651**	*2,300*
Income Tax recoverable under Gift Aid & Deeds of Covenant	**758**	—	**758**	*590*
	12,883	—	**12,883**	*9,860*
DONATIONS	**97**	—	**97**	*38*

INVESTMENT INCOME					
Herbert Stevens Trust Fund		**10,410**	—	**10,410**	*10,215*
Barrington Trust Fund		**36**	—	**36**	*36*
Interest received		**4,722**	**2,797**	**7,519**	*6,519*
		15,168	**2,797**	**17,965**	*16,770*
SALES OF PUBLICATIONS					
Bulletin		**156**	—	**156**	*160*
Other BOC publications		**1,100**	—	**1,100**	*831*
Joint BOU/BOC publications		**2,237**	—	**2,237**	*4,475*
		3,493	—	**3,493**	*5,466*
MEETINGS		**3,860**	—	**3,860**	*4,127*
OTHER INCOME		**173**	—	**173**	*351*
TOTAL INCOME		**35,674**	**2,797**	**38,471**	*36,612*
RESOURCES EXPENDED					
CHARITABLE EXPENDITURE					
MEETINGS					
Room and equipment hire, speakers' expenses, etc.		**1,588**	—	**1,588**	*1,468*
Restaurant		**4,080**	—	**4,080**	*4,119*
CONFERENCE SPONSORSHIP		—	—	—	*500*
BOC BULLETIN					
Production, printing and distribution		**13,932**	—	**13,932**	*13,821*
OTHER PUBLICATIONS					
Production costs		**11,110**	**221**	**11,331**	*1,762*
Publicity, postage and packing		**688**	—	**688**	*945*
ADMINISTRATION	7	**6,860**	—	**6,860**	*3,807*
OTHER EXPENDITURE		—	—	—	*180*
TOTAL EXPENDITURE		**38,258**	**221**	**38,479**	*26,602*
SHORTFALL / EXCESS OF INCOME OVER EXPENDITURE		**(2,584)**	**2,576**	**(8)**	*10,010*
Increase in value of investments		**28,492**	—	**28,492**	*20,067*
		25,908	**2,576**	**28,484**	*30,077*
TOTAL FUNDS brought forward at 1 January 2005		**330,565**	**56,872**	**387,437**	*357,360*
TOTAL FUNDS at 31 December 2005		**356,473**	**59,448**	**415,921**	*387,437*

NOTES TO THE ACCOUNTS—31 December 2005

1. ACCOUNTING POLICIES

a) Basis of Accounts. The financial statements are prepared under the historical cost convention as modified by the inclusion of investments in the Herbert Stevens and Barrington Trust Funds at market values. They are also prepared in accordance with the Financial Reporting Standards for Smaller Entities and follow the recommendations in Accounting and Reporting by Charities: Statement of Recommended Practice (revised 2005).

b) Investments and Cash Deposits. The Herbert Stevens and Barrington Trust Funds are invested in quoted charity unit trusts and included as investments in the Balance Sheet at year-end market values. Income from these funds and from cash deposits shown in the Balance Sheet under Current Assets is included in Incoming Resources in the Statement of Financial Activities on a receipts basis. The Clancey Bequest is held in a fixed term, Building Society deposit account which forms part of the total of investments in the Balance Sheet. Interest on this deposit account is brought into the Statement of Financial Activities on an accruals basis.

c) Subscriptions. Subscriptions for the current year and any arrears are included in Incoming Resources in the Statement of Financial Activities. Subscriptions received in advance are carried forward in the Balance Sheet as Current Liabilities.

d) Expenditure is accounted for on an accruals basis.

e) Depreciation. Depreciation of fixed assets is calculated to write off their value over their expected useful lives at an annual rate of 25% on cost.

f) Publications. The cost of publications is written off in the Statement of Financial Activities as incurred except for a nominal stock value of £100 carried in the Balance Sheet.

2. FIXED ASSETS	**2005**
Projection Equipment	**£**
Cost at 1 January and 31 December 2005	**648**
Accumulated depreciation at 1st January 2005	**162**
Charge for the year	**162**
At 31 December 2005	**324**
Net Book Value: At 31 December 2005	**324**
At 31 Decemebr 2004	*486*

3. INVESTMENTS—at market value	**2005**	*2004*
	£	£
UNRESTRICTED FUNDS		
Herbert Stevens Trust Fund	**256,714**	*228,381*
Barrington Trust Fund	**1,162**	*1,003*
RESTRICTED FUNDS		
Clancey Bequest	**49,000**	*49,000*
	306,876	*278,384*

All investments are held in the UK.

4. UNRESTRICTED DESIGNATED FUND	**2005**
for future publications	£
Balance at 1 January 2005	**20,000**
Designated during the year	—
Balance at 31 December 2005	**20,000**

5. OTHER UNRESTRICTED FUNDS

	GENERAL FUND	HERBERT STEVENS TRUST FUND	BARRINGTON TRUST FUND	TOTAL
	£	£	£	£
Balances at 1 January 2005	81,181	228,381	1,003	310,565
Increase in value of investments during year	—	28,333	159	28,492
Shortfall of income over expenditure	(2,584)	(2,584)		
Balances at 31 December 2005	**78,597**	**256,714**	**1,162**	**336,473**

6. RESTRICTED FUNDS

	CLANCEY BEQUEST	PUBLICATIONS FUND	BIRD ATLAS OF UGANDA FUND	TOTAL
	£	£	£	£
Balances at 1 January 2005	52,528	4,132	212	56,872
Expenditure during the year	(221)	(221)		
Interest received	2,601	187	9	2,797
Balances at 31 December 2005	**55,129**	**4,319**	—	**59,448**

a . The Clancey bequest was donated by the late Dr P. A. Clancey with the request that it should be used to support and enhance the Club's Bulletin.

b . The Publications Fund is available to finance Club publications other than regular issues of the Bulletin.

c . The Bird Atlas of Uganda Fund was earmarked to assist with the production and publication of the Atlas and has now been fully applied for that purpose.

7 . ADMINISTRATION EXPENSES

	2005	*2004*
	£	£
Club's share of rental of storage unit	**916**	*916*
Audit and Independent Examination fees	**550**	*550*
Depreciation	**162**	*162*
BOU administration services	**3,080**	*642*
Other administration expenses	**2,152**	*1,537*
	6,860	*3,807*

8. REIMBURSEMENT OF EXPENSES

Trustees do not receive any remuneration or any reimbursement of costs they may incur in attending Trustee meetings. They are reimbursed for any other expenses incurred on behalf of the Club. The total amount reimbursed during the year was £1,072 (*2004 £1,576*).

INDEPENDENT EXAMINERS REPORT TO THE TRUSTEES OF THE BRITISH ORNITHOLOGISTS' CLUB

I report on the accounts of the Club for the year ended 31 December 2005, which are set out on pages 89–92.

Respective responsibilities of trustees and examiner

The charity's trustees are responsible for the preparation of the accounts. The charity's trustees consider that an audit is not required for this year (under section 43(2) of the Charities Act 1993 (the 1993 Act)) and that an independent examination is needed.

It is my responsibility to:

- Examine the accounts (under section 43(3)(a) of the 1993 Act);
- To follow the procedures laid down in the General Directions given by the Charity Commissioners (under section 43(7)(b) of the 1993 Act); and
- To state whether particular matters have come to my attention.

Basis of independent examiners' report

My examination was carried out in accordance with the General Directions given by the Charity Commissioners. An examination includes a review of the accounting records kept by the charity and a comparison of the accounts presented with those records. It also includes consideration of any unusual items or disclosures in the accounts, and the seeking of explanations from you as trustees concerning any such matters. The procedures undertaken do not provide all the evidence that would be required in an audit and, consequently, I do not express an audit opinion on the view given by the accounts.

Independent examiners' statement

In connection with my examination, no matter has come to my attention:

(1) which gives me reasonable cause to believe that, in any material respect, the requirements:
   - to keep accounting records in accordance with s41 of the 1993 Act; and
   - to prepare accounts which accord with the accounting records and to comply with the accounting requirements of the 1993 Act have not been met; or

(2) to which, in my opinion, attention should be drawn in order to enable a proper understanding of the accounts to be reached.

Alan Peal
Alan Peal ACA—Principal
Porritt Rainey
Chartered Accountants

25 April 2006

A new brush-finch in the *Atlapetes latinuchus* complex from the Yariguíes Mountains and adjacent Eastern Andes of Colombia

by Thomas M. Donegan & Blanca Huertas

Received 28 May 2005; final revision received 13 February 2006

The brush-finches *Atlapetes* are Neotropical passerines which achieve greatest diversity in the Andes and whose taxonomy and ecology have received much recent attention. *Atlapetes* shows a high degree of geographical variation, with various forms restricted to particular elevations, mountains or slopes, but few cases of true sympatry. The group is therefore ideally suited to studies of the patterns and mechanisms of speciation (Remsen & Graves 1995a, García-Moreno & Fjeldså 1999). Even recently, localised taxa have been described, both at species and subspecies level (e.g. Fitzpatrick 1980, Remsen 1993, Valqui & Fjeldså 1999), and a species thought possibly extinct was rediscovered (Agreda *et al.* 1999).

Serranía de los Yariguíes and the Eastern Cordillera

The Eastern Cordillera (Eastern Andes) is one of Colombia's three principal mountain ranges, extending from dpto. Cauca (01°N), to the Serranía de Perijá, on the Caribbean coast (11°N). It is characterised by a varied habitats, with slopes bordering Amazonia, the llanos and Magdalena Valley, humid and dry regions, plateaux, steep slopes and wetlands. The cordillera's cool climate and high-elevation savannas have long been subject to human development. It is also one of the world's major centres of avian endemism, the Colombian East Andes Endemic Bird Area (Stattersfield *et al.* 1998).

The Serranía de los Yariguíes (dpto. Santander) is an isolated western spur of the East Andes, rising to *c.*3,400 m and isolated from the rest of the cordillera to the north and east by the Sogamoso Valley, and to a lesser extent to the south by depressions associated with the ríos Horta, Quirola and Opón and their tributaries. A collection of 60 bird species was made below 1,000 m near San Vicente de Chucurí in November 1956 (Borrero & Hernández 1957), and a few specimens were taken elsewhere on the massif, generally on the drier eastern slope (e.g. Romero 1983), but the humid western slope and highest elevations were very poorly known ornithologically prior to our field work (for general results see Donegan & Briceño 2005, Donegan & Huertas 2005, Donegan & Avendaño 2006, Huertas & Donegan 2006). Amongst the birds we recorded was one which initially appeared to be of the 'Northern Rufous-naped Brush-finch' or 'Yellow-breasted Brush-finch' complex, *A. latinuchus*.

Paynter (1978) specifically commented on the absence of records of *A. latinuchus* (then classified as *A. rufinucha*) from the central part of the Eastern Cordillera, noting 'While it is present in the Sierra de Perijá, a northward extension

of the Eastern Andes on the Venezuela–Colombia border, it has not been found in the Eastern Andes except for a few dubious records from Bogotá (*A. r. simplex*, known only from native Bogotá specimens)'. The range of *A. l. simplex* was subsequently thought to comprise the central eastern plateaux and perhaps the east slope of the Eastern Andes between Lago de Fuquene (dpto. Cundinamarca) and Soatá (dpto. Boyacá) (Borrero & Olivares 1955, Hilty & Brown 1986, Ridgely & Tudor 1989). However, such records and reported 'variations' in the plumage of *A. l. simplex* derive from immatures and subadults in collections, a failure to compare types and new material, and the existence of two taxa from different regions.

Methods

The Colombian EBA (Evaluation of Biodiversity in the Andes) Project is an ongoing research and conservation initiative, supported by Fundación ProAves, that has conducted Rapid Biodiversity Assessments of remote and/or unstudied sites since the mid 1990s.

We studied ten primary-forest sites on both slopes of the Serranía de los Yariguíes at elevations of 100–3,200 m between January 2003 and January 2006. Each site was subject to 4–6 days' field work using mist-netting (up to 220 m of mist-nets) and non-systematic observations including sound-recording and playback. On 4–8 January 2004, we visited a remote site, at 2,400–2,450 m, on the west slope, accessed from Cantagallos, in San Vicente de Chucurí municipality, to Finca Santo Domingo (2,250 m), from where we reopened a disused trail to the ridge at 2,450 m.

On 6 January 2004, together with Elkin Briceño, we trapped an *Atlapetes* which showed features of the *A. latinuchus* complex, e.g. a rufous cap, black mask, yellow underparts and an indistinct moustachial (Fig. 1A–B), but differed from all other populations in its jet black mantle, tail and wings, and from some taxa in the group by the lack of a white speculum. *A. latinuchus* is unknown from the north-central Eastern Cordillera (Hilty & Brown 1986), with the distinctive form *A. l. nigrifrons* to the north and paler-backed *A. l. simplex* postulated to occur further south in the cordillera. Given this, we considered it probable that the bird represented an undescribed taxon. Due to poor weather conditions for photography, we retained the bird overnight for further study but, unusually for an *Atlapetes*, it died overnight. The bird was prepared in the field as a flat skin.

Comparison of our photographs and wing- and tail-feathers from the bird with a 'Bogotá' *A. l. simplex* in the Natural History Museum (NHM; Tring) revealed various differences between them, with *A. l. simplex* having a grey/brown back, paler red crown, small white speculum and larger yellow supraloral spot (Fig. 1C). Further research revealed additional specimens of the black-backed form from the Virolín area, dpto. Santander, on the west slope of the main Eastern Cordillera, *c.*60 km south-east of Serranía de los Yariguíes. On 8 January 2005, at Lepipuerto, on the upper río Chimera, El Carmen/Simacota municipality (06°28'N, 73°28'W; 2,900 m), TD and Martin Donegan observed and sound-recorded a pair foraging in

Figures 1A–B. Holotype of *A. l. yariguierum* (Blanca Huertas/EBA Project)

Figure 1C. *A. l. simplex* (=*A. l. spodionotus*) neotype (Thomas Donegan, © Natural History Museum, Tring). Note difference in contrast between upperparts and mask colour compared to the holotype, the very small but visible white speculum and relatively strong malar, each consistent with *A. l. spodionotus*.

páramo. Further observations and the capture of another bird (from which a blood sample was obtained) were made in July 2005, during 'Proyecto YARE', by ourselves and Jorge Avendaño in páramo at Filo Pamplona, Galán municipality (06°38'N, 73°24'W; 3,200 m), on the east slope of the massif.

Type material of *A. l. simplex*

Project Biomap provided data from all museums holding Colombian specimens. We also searched an online database (www.biologie.uni-ulm.de) of all major German museums, but were unable to locate the two *A. l. simplex* specimens mentioned in the type description (Berlepsch 1888). All remaining specimens from the Berlepsch collection are now held in Frankfurt, except a few specimens in Warsaw (F. Steinheimer *in litt.* 2005), neither of which institutions possess any *A. l. simplex*

Figure 1D. Close-up of mantles and crown of (left to right) adult *A. l. simplex* neotype ('Bogotá', Colombia = *A. l. spodionotus*), subadult *A. l. elaeoprorus* (Central Andes, Antioquia, Colombia), adult *A. l. comptus* (southern Ecuador and northern Peru), and adult *A. l. spodionotus* (Ecuador and southern Colombia). (Thomas Donegan, © Natural History Museum, Tring). Note contrast between the grey upperparts and black face on *A. l. simplex* compared with much darker *A. l. elaeoprorus*, and the paler crown of *A. l. simplex* compared to *A. l. elaeoprorus*. *A. l. yariguierum* averages blacker than *A. l. elaeoprorus* with essentially no contrast between the mask and upperparts in adults. Note also similarity between '*A. l. simplex*' and *A. l. spodionotus*. NB: adult male *A. l. elaeoprorus* has essentially black upperparts (as in tail of the subadult), not black admixed olive.

(G. Mayr *in litt.* 2005, N. Krabbe *in litt.* 2006). It seems probable that the *A. l. simplex* types were either destroyed or lost during World War II (G. Mayr *in litt.* 2005). The *A. l. simplex* at NHM is a male, apparently adult, originally from the Berlepsch collection. It too is dated 1888, and the label is annotated 'agrees with types' in Berlepsch's hand. The plumage, particularly the trace of a small white speculum, is consistent with Berlepsch's (1888) brief description (although some apparent adult/immature variation is noted, with the adult somewhat darker). This specimen, like the types, is labelled 'Bogotá'. Thus, we assume this specimen to be typical of the form described by Berlepsch as *A. l. simplex*, and propose to treat it as a neotype of *A. l. simplex*.

A. l. simplex is a junior synonym of *A. l. spodionotus*

The *A. l. simplex* neotype is indistinguishable from *A. l. spodionotus* of the main Andean range in southern Colombia and northern Ecuador. 'Bogotá' trade skins originated from as far away as Panama or Ecuador and several taxa (including the recently described Bogotá Sunangel *Heliangelus zusii*) are known only from such material (see Graves 1993). *A. l. simplex* was described with, and appeared in the same consignment as, the antbird taxon *Myrmeciza longipes boucardi*, a form now known to be restricted the upper Magdalena Valley of Colombia, from dpto. Tolima to the headwaters at 1,700 m (Hilty & Brown 1986). It seems feasible that *A. l. simplex* skins may originate from slightly further south, where *A. l. spodionotus* is present. Other taxa until recently known in Colombia only or principally from Bogotá skins, e.g. Band-bellied Owl *Pulsatrix melanota*, Black-streaked Puffbird *Malacoptila fulvogularis* and Red-billed Parrot *Pionus sordidus*, have recently been found there (Salaman *et al.* 2002). The case for *A. l. simplex* being distinct from *A. l. spodionotus* was not made by Berlepsch (1888), who focused on the differences from *A. l. elaeoprorus* of Antioquia. It seems that *A. l. simplex* is better treated as a junior synonym of *A. l. spodionotus* (Sclater & Salvin 1879).

Description

With the status of *A. l. simplex* resolved, questions concerning the dark-backed populations of *A. latinuchus* in the Serranía de los Yariguíes and adjacent slope of the Eastern Cordillera is clarified, and some supposed 'variations' in plumage of birds from this region can be discarded. This Eastern Cordillera population differs from all other described *Atlapetes* taxa. We propose to name it:

***Atlapetes latinuchus yariguierum* subsp. nov.**
Yariguíes Brush-finch
Gorrión-montés de los Yariguíes

Holotype Adult male, no. ICN-34016 of the ornithological collection of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia (ICN), Bogotá, Colombia (Fig. 1a). Prepared by TD, on 7 January 2004, at Alto Cantagallos,

Serranía de los Yariguíes, San Vicente de Chucurí municipality, dpto. Santander, Colombia (06°49'N, 73°22'W). Study specimen produced from flat skin by F. G. Stiles. The locality is at 2,400 m on the west slope of the Yariguíes massif, Eastern Andes, in lower montane cloud forest. Tissue samples and stomach contents are held at the Instituto Alexander von Humboldt's molecular laboratory, Cali, Colombia.

Paratypes and other material We examined specimens of all *A. latinuchus* taxa (except *A. l. chugurensis*) in the following institutions: ICN (Bogotá), NHM (Tring), University Museum of Zoology, Cambridge, UK (UMZC), Instituto Alexander von Humboldt, Villa de Leyva, Colombia (IAVH), Museo de la Universidad de la Salle, Bogotá, Colombia (MLS), Museo de Historia Natural, Universidad Industrial de Santander, Bucaramanga, Colombia (UIS) and Muséum National d'Histoire Naturelle, Paris, France (MNHN). Digital photographs of all *A. latinuchus* specimens in the Colección Ornitológica Phelps, Caracas, Venezuela (COP) and some in the Field Museum of Natural History, Chicago, USA (FMNH) were also inspected (see Appendix 1). We assign the following paratypes:

Adult sex unknown, no. UIS 1412, collected by V. H. Serrano, on 23 August 2001, at Santa Helena (06°00'N, 73°09'W), between Charalá and Duitama, Boyacá, at 2,400 m, on the west slope of the Eastern Andes. Subadult female, no. ICN-25111, prepared 28 November 1978 (collector unknown), from Charalá, dpto. Santander (*c.*06°05'N, 73°12'W) on the west slope of the Eastern Andes. Subadult (probably female), DNA sample and photographs taken on 12 July 2005 by TMD & J. Avendaño, at Filo Pamplona, Serranía de los Yariguíes (06°38'N, 73°24'W; 3,200 m); DNA sample deposited at UIS.

The following juveniles also appear to be of the new taxon but are not assigned as paratypes: juvenile male, no. ICN-3199, collected by A. Olivares, on 7 January 1953, at Soatá, Alto de Onzaga, Boyacá, (*c.*06°35'N, 72°07'W) on the east slope of the East Andes (juvenile plumages are poorly known, making this is a tentative identification); juvenile of unknown sex, no. ICN-10322, collected by A. Olivares & P. Bernal, on 9 July 1961, in Vereda Ruparita, 2 km east of Arcabuco, Boyacá, (*c.*05°73'N, 73°45'W) on the west slope of the East Andes.

The following specimens, of which we have seen digital photographs, are also apparently of the new taxon but are not assigned as paratypes: subadult male, no. FMNH-220606, collected by Kjell von Sneidern, in 1950, above Chiquinqirá, Boyacá (*c.*05°37'N, 73°50'W) on the east slope of the East Andes; juvenile. no. FMNH-220607, taken by the same collectors, from the same locality, on the same date as ICN-10322.

Diagnosis A typical *Atlapetes* with various characteristics of the *A. latinuchus* complex, including dark upperparts and yellow underparts, a rufous crown, (concealed) white speculum, black mask and indistinct moustachial (Hilty & Brown 1986), but differing from others within the *A. rufinucha* complex by its sharply demarcated rufous cap (at least in adults), yellow malar, slight melanism on the

flanks, and white speculum (García-Moreno & Fjeldså 1999). Analysis of molecular data shows it to be related to *A. l. elaeoprorus* and *A. l. spodionotus* (see below).

A. l. yariguierum differs from all forms of *A. latinuchus* in its uniform jet black mantle, tail, and wings (with no olivaceous or greyish tones, except in juveniles, or white speculum), and virtually no contrast between the black mask and upperparts (though some adult *A. l. elaeoprorus* approach this). A 'rather greyish back' was considered diagnostic of the *A. latinuchus* group by García-Moreno & Fjeldså (1999). Adult *A. l. yariguierum* is notably darker rufous on the crown than other *A. latinuchus* taxa (some adult *A. l. elaeoprorus* approach it), and is further distinguished by the lack of a visible speculum, obvious supraloral spot, dark forehead markings, strong malar or white/cream on the nape. Similarities between *A. l. elaeoprorus* and *A. l. yariguierum* perhaps indicate previous contact between taxa of the northern Central and Eastern Cordilleras, also evidenced amongst subspecies of *Grallaricula nana*, *Phaethornis syrmatophorus* and *Basileuterus*

Figure 2. From left to right (youngest to oldest): juvenile apparent *A. l. yariguierum* (Soatá, Boyacá, east slope of East Andes); juvenile *A. l. yariguierum* (Arcabuco, Boyacá, west slope of East Andes); subadult paratype *A. l. yariguierum* (Virolín, Santander, Colombia, west slope of East Andes), and adult holotype *A. l. yariguierum* (Serranía de los Yariguíes, Santander, Colombia) at ICN-UN (Thomas Donegan). Note black tails of all birds. Ages ascribed on basis of plumage as no skull ossification data on specimen labels (except holotype).

tristriatus (TMD unpubl.). However, *A. l. elaeoprorus* always has a large white speculum and large yellow supraloral (unlike the almost indiscernible short line of yellow feathers below the rufous cap in *A. l. yariguierum*). Juvenile *A. l. elaeoprorus* has the back tinged dark greenish, whereas in *A. l. yariguierum* it is tinged dark brownish.

A. l. yariguierum differs from *A. l. spodionotus* in its combination of black mantle and tail, deeper rufous crown and reduced yellow feathering at the bill base. A report of the supraloral being variable in *A. l. simplex* (Paynter 1978) appears based on differences between the types and recent Eastern Cordillera material. Some *A. l. spodionotus* (including the *A. l. simplex* in Tring) show traces of a visible speculum in the folded wing. In all *A. l. yariguierum* observed in the field or museum, the speculum is invisible on the folded wing, though this feature could be visible, especially when moulting. In *A. l. spodionotus*, where the speculum extends almost to the greater coverts, it is visible in some individuals and not in others (Paynter 1978).

A. l. yariguierum is separable from the *A. schistaceus* group by its yellow underparts and lack of strong moustachial or supraloral; from *A. albofrenatus* taxa by the absence of a well-defined moustachial and its black (not olive-green) mantle; from *A. l. nigrifrons* and *A. melanocephalus* by the lack of a black upper throat or forehead, pale moustachial or grey lores, and from the latter by its rufous cap; and from *A. pallidinucha* taxa in its uniform dark rufous crown and nape in adults. Morphometrics of these taxa are presented in Appendix 3.

Description of holotype Capitalised colour nomenclature and numbers from Munsell Color (1977) and Munsell Color (2000). Adult male with skull 100% ossified (mass 22.6 g). Testes 8 mm × 5 mm (apparently somewhat enlarged with small cloacal protuberance in life) and little subcutaneous fat. Stomach contents included various small pieces of Coleoptera exoskeleton. Twelve rectrices, nine primaries, six secondaries and three tertials, typical of the Emberizinae. Flight-feathers fresh, with rectrices full (except fifth rectrix from left, 95% emerged), suggesting recent completion of moult. Emarginated pp6–9 (slight emargination on p5), with rounded wing point pp4–6 and primary notches absent (following Proctor & Lynch 1993). Max. flattened wing (following Svensson 1992) 77 mm, tail 80 mm, tarsus 25 mm, culmen to skull 16 mm. Crown dark rufous (closest to P, 10R: 4/8); facial mask jet black; mantle, wing-coverts, alula, flight-feathers, rump and rectrices closest to black (Gley 1: 2.5/2.5 but darker; *cf.* greyish brown, closest to 10YR 3/1 or 2/2 of '*A. l. simplex*' and *A. l. spodionotus*), with virtually no contrast between mask and back. Very narrow line of six short Yellow (5Y 8/12) feathers below rufous crown, at base of bill. Throat, malar, breast and belly uniform Yellow (5Y 8/12), becoming slightly yellower on belly and washed slightly darker on flanks. Indistinct darkish moustachial extends *c.*16 mm from bill. Underside of carpal Yellow (5Y 8/12) with small blackish spots. Base of pp4–6 concealed under greater coverts frontally White (Gley 1 8/1). Each except outermost primary and innermost

five secondaries distally near White (Gley 1 8/1). Bare parts: mandible uniform black; legs horn, with feet soles yellowish grey; iris dark rufous.

Variation in the series Plumage and biometrics of the adult paratype essentially very similar to those of the holotype. The subadult paratype at UIS has a slightly paler rufous cap (*c*.2.5YR 4/8, but still darker than adult *A. l. simplex/spodionotus*),

Figure 3. Map showing sites at which *A. l. yariguierum* has been reported (blue squares; unfilled squares = unconfirmed records). All *A. l. yariguierum* records post-date Paynter (1972). Also shown are known ranges of *A. l. elaeoprorus* (unfilled red circles); *A. l. caucae* (purple-filled circles); and *A. l. spodionotus* (unfilled pink ellipses) in Colombia, based on specimens, published literature, data from Project Biomap and additional sight records reported to the authors. Apparent gaps in distribution are partly due to observational lacunae, sometimes exacerbated by deforestation, and partly due to ranges of congeneric ecological competitors (see Remsen & Graves 1995). The southernmost record of *A. l. elaeoprorus* in the West Andes and the northernmost, from the Serranía de San Lucas, are from data supplied by Project Biomap. Both require confirmation. Observations from the East Andes in Cauca are of birds with a strong white speculum (J. Idrobo *in litt.* 2005) and therefore appear more likely to be of *A. l. caucae* than *A. l. spodionotus*. Of this group, *A. l. yariguierum* emerges as the taxon known from the largest number of localities in Colombia.

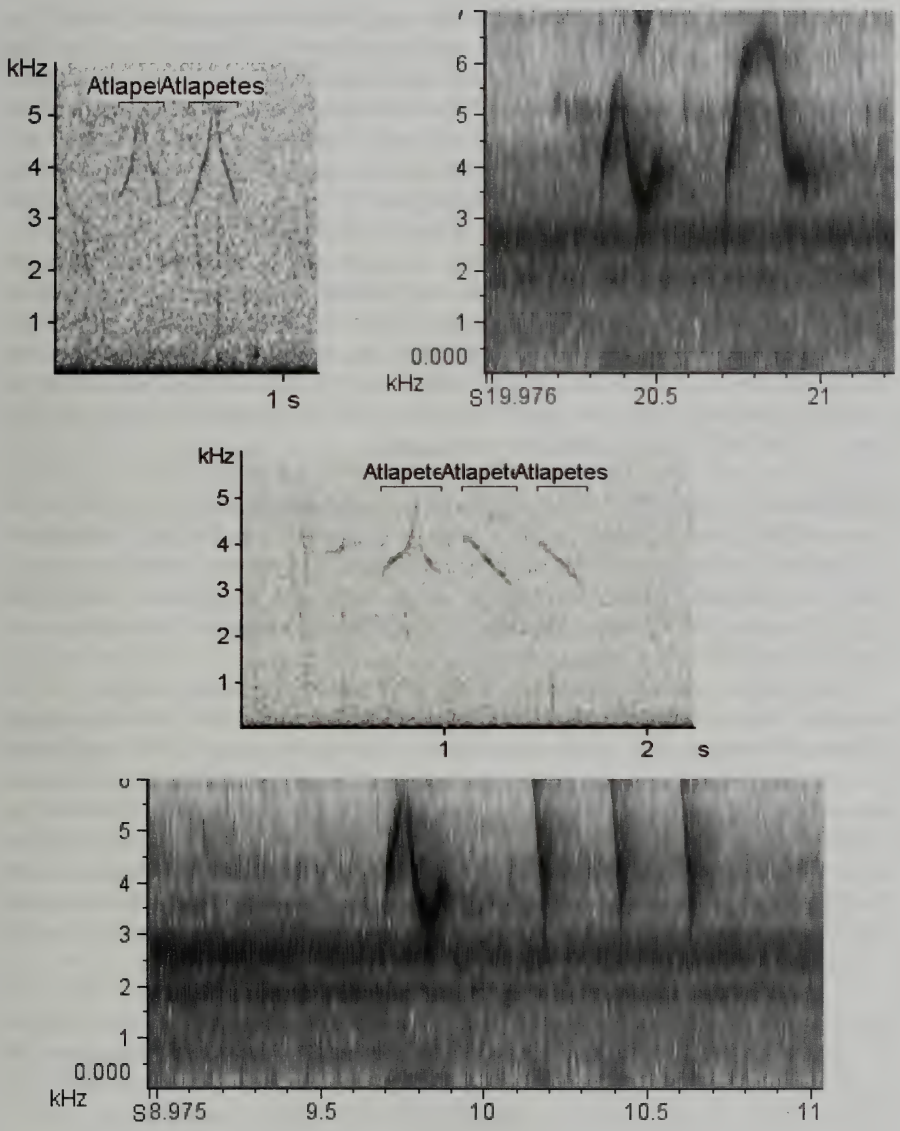

Figure 4. Vocalisations of *A. l. yariguierum* recorded at Lepipuerto, Serranía de los Yariguíes (top left and middle). Sonograms of *A. l. yariguierum* produced by Richard Ranft (British Library) using Avisoft Pro software from recordings by TMD. In each case, *A. l. yariguierum* vocalisations are presented together with the most similar recordings of *A. l. spodionotus* from Yanacocha, Pichincha, Ecuador (00°08'S, 78°35'W). Sonograms for *A. l. spodionotus* were produced by TMD using Raven Lite software, from recordings by J. V. Moore *in* Krabbe *et al.* (2001).

both black and brownish (particularly at the base of the rump) mantle feathers, but the tail- and flight-feathers and most of the upperparts similar to adults. The demarcation between the rufous crown and dark back is less sharp in non-adults of *A. l. yariguierum*, a feature of other *A. latinuchus* taxa (birds in Vellinga *et al.* 2004 are probably an example of this). ICN-3199 is similar to the subadult paratype, but has more brownish and fewer black feathers, a paler crown and less obvious demarcation between the crown and upperparts. It has a very pale rufous nape (approaching *A. pallidinucha*) and more brown and fewer black feathers in the upperparts. The juvenile at FMNH has a darker crown and nape but similar upperparts. All specimens in the series have a jet black tail (as does *A. l. elaeoprorus* at all ages). The ICN series appears in Fig. 2. We cannot eliminate the possibility that *A. l. yariguierum* may involve two taxa or clinal variation: it seems feasible that those from Yariguíes are on average slightly darker overall with less yellow on the supraloral than birds from the main cordillera. The pale-naped bird from the east slope in Soatá also requires further investigation.

Vocalisations We sound-recorded a pair observed at Lepipuerto (Fig. 4). The call is typical of the genus: a short series of high-pitched, rising and falling whistles at *c.*3–5 kHz: *wiu-wiu*, *wiu-weeu-weeu*, *wee-weeu-weeu* and *wee-wiu-weeu-weeeu*. TD also once heard a 'stuttering' finch song, probably *A. l. yariguierum* and similar to *A. latinuchus* in Ecuador, but this was not sound-recorded. Recordings are deposited at the British Library (no. 142861), London.

Published sound-recordings of *A. l. spodionotus* from Ecuador suggest that *A. latinuchus* taxa, like other oscines, possess a wide repertoire. Small possible differences between *A. l. spodionotus* and *A. l. yariguierum* are: *A. l. yariguierum* calls appear simpler and include notes that increase and decrease in pitch more uniformly (straight line on the sonogram), and which decrease in pitch more slowly, than in *A. l. spodionotus*. With just two recordings of *A. l. yariguierum*, it is impossible to know whether calls are significantly different from *A. l. spodionotus*, which has very varied calls (Krabbe *et al.* 2001). Vocalisations are poorly known for Colombian *Atlapetes*, begging additional research which may have taxonomic implications.

Distribution It is probable that *A. l. yariguierum* is restricted to high elevations in the Serranía de los Yariguíes and adjacent Eastern Andes (Fig. 3). We are aware of the following records: Galilea, Reserva Biológica Chachalú (06°05'N, 73°09'W; 2,350 m, the paratype locality), trapped 30 October 2003 (weight 30 g) and 27 November de 2003 (weight 28.7 g), with three sight records (D. A. Rincón G.). Rogitama, dpto. Boyacá (*c.*05°47'N, 73°31'W), south-west of Chachalú, where frequently observed and an adult photographed (R. Chavarra C.). Soatá, Boyacá (see Paratypes), in oak forest at *c.*2,900–3,100 m (O. Cortés), El Talisman, Serranía de los Yariguíes (*c.*06°51'N, 73°22'W) photographed in February 2006 at 2,050 m (M. Sharp & C. Turner).

The following records also probably involve *A. l. yariguierum* but require confirmation: Finca El Diviso, dpto. Santander (07°08'N, 73°02'W; 1,850m), on 30 December 2004 (D. A. Rincón G.); Mesa de los Otero, Curití municipality, dpto. Santander (06°37'N, 73°00'W, 2,100–2,250 m), on 19 November 2004 (J. Parra B.); Santuario de Fauna y Flora Iguaque, dpto. Boyacá (05°40'N, 73°27'W, 3,045–3,065 m) (C. D. Cadena & J. E. Zuluaga); and Sutamarchan, Serranía de Merchan, dpto. Boyacá (*c.*05°37'N, 73°38'W), in April 2003 (M. Á. Echeverry).

Overall, a pattern of fairly continuous distribution within humid forests of the central Eastern Andes, principally on the west slope but also apparently on the east side, emerges. To date, *A. l. yariguierum* has been recorded at 1,800–3,200 m, being apparently at least partially replaced lower by Yellow-throated Brush-finch *A. gutturalis* (recorded at 2,000 m on the west slope of Serranía de los Yariguíes) and Moustached Brush-finch *A. albofrenatus* (recorded at 2,000 m on both slopes of Serranía de los Yariguíes). In the main cordillera, it is at least partially replaced at high elevations by Slaty *A. schistaceus* and Pale-naped Brush-finches *A. pallidinucha*, though neither of these has been recorded in the Yariguíes range in surveys almost to the peak, where *A. l. yariguierum* is present. Elevational and latitudinal distributions of these taxa are described and discussed in Remsen & Graves (1995a). The range of *A. l. yariguierum* is shared by other endemics, e.g. Gorgeted Wood-quail *Odontophorus strophium* and Mountain Grackle *Macroagelaius subalaris*, which are both Critically Endangered (BirdLife International 2004).

Etymology Our name honours the Yariguíes indigenous people and the massif that bears their name, expressed as a fifth declension feminine Latin noun *yariguies*, and declined in the genitive plural. Serranía de los Yariguíes is often labelled on maps as Serranía de los Cobardes (Mountains of the cowards), which derives from the colonial era. The Yariguíes people resisted the Spanish, although was doomed to fail in the face of a technologically superior military power. Rather than submit, the Yariguíes committed mass suicide. The Spanish viewed this not as an act of dignity, but of cowardice. Colombian governmental agencies and NGOs are endeavouring to remove the insult from official materials, and Serranía de los Yariguíes is now the preferred name. The region is rich in archaeological sites and indigenous art, which to date have gone largely unrecognised due to the historic security situation and difficulty of access.

Ecology

The holotype was captured in a treefall gap with successional vegetation, *c.*1 km from human-modified habitat, in forest on a west-facing slope overlooking the Magdalena Valley, characterised by a canopy of 8–14 m, dense understorey and epiphytic growth, persistent fog or rain, little insolation (less than 30 minutes daily during field work), and 30–50° slope. Observations at Lepipuerto were made in pristine primary treeline and páramo habitat *c.*30 km from any human population,

and also subject to very high levels of precipitation, with torrential rain lasting several hours each day during the 'dry' season, and frequent ground-level cloud cover. The pair observed here foraged in small tree-like shrubs on an exposed slope. Observations at the third site in Serranía de los Yariguíes were also in pristine treeline and páramo habitat far from human populations. All three sites are within the same tract of forest, this being one of the largest such forests in northern Colombia. Successional primary forest, at the type locality, and fairly open vegetation of the Yariguíes páramo appear to be the natural habitat of *A. l. yariguierum*. *A. latinuchus* taxa regularly invade secondary habitats (Remsen 1993, Hilty, 2003). The new taxon also appears to do so, and indeed seems commoner in such habitats than in primary forest in the main Eastern Andes.

Moult

The very fresh plumage and emergent rectrix of the holotype indicate it had recently completed a moult, whilst the enlarged testes and cloacal protuberance indicate pre-breeding moult, and that this form's breeding season coincides with the wettest part of the year, in February–April (the main breeding season in the adjacent Central Andes of the Magdalena Medio: Cuervo *et al.* 2001).

Discussion

García-Moreno & Fjeldså (1999) recently re-evaluated species limits within *Atlapetes* using molecular data. The taxonomy of the group was previously based on morphological analyses (Paynter 1972, 1978), with the taxa *A. schistaceus* and *A. rufinucha* delimited largely on the presence of grey (*schistaceus* group) or yellow underparts (*rufinucha*; *pileatus* group). Thereafter, Remsen & Graves (1995a) suggested that several geographically close taxa with alternating grey and yellow underparts may be more closely related to one another than to more geographically distant taxa with similar underparts coloration. García-Moreno & Fjeldså's phylogeny supported Remsen & Graves' propositions, and suggested further that many sister taxa should be ranked specifically.

García-Moreno & Fjeldså's analysis concentrated on southern Andean taxa. Their suggestion that the various Bolivian, Peruvian and some Ecuadorian *Atlapetes* be reassigned to two polytypic and six monotypic species has been followed by most subsequent works (Rodner *et al.* 2000, Ridgely & Greenfield 2001, Salaman *et al.* 2001, Hilty 2003, Dickinson 2003, Remsen *et al.* 2006). The northern taxa of *A. latinuchus*, *A. schistaceus*, *A. albofrenatus* and *A. melanocephalus* were not studied in detail, but various taxa formerly considered part of *A. rufinucha*, namely *baroni, caucae*, *chugurensis*, *comptus*, *elaeoprorus*, *latinuchus*, *nigrifrons* (=*phelpsi*: see below), *simplex* (=*spodionotus*) and *spodionotus*, were tentatively reassigned to *A. latinuchus*. García-Moreno & Fjeldså noted 'Our study did not include ... various more richly coloured forms in the northern Andes ... However, it is evident that the current sequence does not reflect natural groupings'.

Due to uncertainties in species limits amongst northern *Atlapetes* taxa and in order to describe *A. l. yariguierum* appropriately, we undertook a preliminary phylogenetic analysis of relevant taxa using a matrix of 16 adult plumage characters. We studied García-Moreno & Fjeldså's 'southern branch', 'central branch' and 'northern branch' taxa (except *A. rufigenis*) together with all other *A. latinuchus*, *A. schistaceus* and *A. tricolor* taxa, as well as *A. fuscoolivaceus*, *A. albofrenatus* and *A. melanocephalus* (which are considered closely related to 'northern branch' species by Paynter 1978), *A. l. yariguierum* and a morphologically distinctive *Atlapetes* recently collected by A. Camero and A. Rodríguez in the Sierra de Perijá ('Perijá bird'). Chestnut-capped Brush-finch *Buarremon brunneinucha* was used as an outgroup to permit comparison with García-Moreno & Fjeldså's phylogeny. Our matrix of character states was compiled from the literature (Paynter 1978, Hilty & Brown 1986, Ridgely & Tudor 1989, Fjeldså & Krabbe 1990, Ridgely & Greenfield 2001, Hilty 2003) and refined by examining specimens of all taxa (except *A. latinuchus chugurensis* and *A. schistaceus taczanowskii*). The characters and character states appear in Appendix 3. Separately, a preliminary phylogeny of northern *Atlapetes* taxa is being constructed by J. Klicka, C. D. Cadena & J. L. Pérez-Emán through analyses of mtDNA genes cytochrome *b* and *ND2*. A sample of the *A. l. yariguierum* holotype is being analysed as part of this study and the preliminary data have been made available to us.

In the morphological study, we first analysed taxa in García-Moreno & Fjeldså's molecular phylogeny for comparative purposes, using *PAUP** v. 4.0 (Swofford 2002), with characters unordered and equally weighted, with no re-weighting. As found by García-Moreno & Fjeldså, in our strict consensus tree close relationships were observed between: (i) Black-faced Brush-finch *A. melanolaemus* and Cuzco (Sooty) Brush-finch *A. canigenis*, (ii) Yellow-breasted Brush-finches *A. latinuchus spodionotus* and *A. l. comptus*, and (iii) Slaty Brush-finches *A. s. schistaceus* and *A. s. taczanowskii*, in each case with high (>50%) bootstrap values. Conversely, Paynter (1978) hypothesised no close relationship between *A. melanolaemus* and *A. canigenis*. However, anomalously, *A. r. rufinucha* was placed in our phylogeny as more closely related to *A. latinuchus* and *A. schistaceus* taxa, and *A. tricolor* as less closely related, than García-Moreno & Fjeldså found. We recognise the limitations of a study involving so few characters (see, e.g., Kitching *et al.* 1999), especially in a group in which pigmentation can be phylogenetically less informative than in other groups. However, an analysis, encompassing a broad range of plumage characters (*cf.* Paynter 1978) can be useful, if interpreted appropriately and conservatively and will provide results comparable with future molecular studies.

Our matrix for all taxa in García-Moreno & Fjeldså's 'northern branch', as well as other Colombian and Venezuelan taxa within *A. albofrenatus*, *A. fuscoolivaceus*, *A. latinuchus*, *A. melanocephalus*, *A. schistaceus* and *A. tricolor* were subject to the same analysis. Three principal multi-taxa clades, each rooted from the same node, were identified in the strict consensus tree as follows: (i) *A. schistaceus*, subspecies *castaneifrons*, *fumidus*, *schistaceus*, *taczanowskii* and *tamae*; (ii) *A. latinuchus*,

subspecies *baroni*, *caucae*, *chugurensis*, *comptus*, *elaeoprorus*, *latinuchus*, *simplex* (=*spodionotus*), *spodionotus* and *yariguierum*; and (iii) *A. melanocephalus*, *A. latinuchus nigrifrons* and the Perijá bird. The latter grouping was supported by bootstrap (83%); the others were not. All *A. fuscoolivaceus*, *A. tricolor* and *A. albofrenatus* taxa were unresolved in our strict consensus tree at the same level. The tree is not reproduced here as we do not propose a phylogeny.

The current *A. latinuchus* complex (except *A. l. nigrifrons*, see below), including *A. l. yariguierum*, formed a monophyletic group. Preliminary data from Klicka *et al.*'s molecular analysis also suggest that *A. l. yariguierum* is most closely related to other *A. latinuchus* taxa (J. Klicka *et al. in litt.* 2005). However, this is a tentative arrangement, especially given the lack of data for other northern taxa such as *A. l. caucae*.

A lack of significant genetic divergence amongst various taxa within *A. latinuchus* (*A. l. chugurensis*, *A. l. comptus* and *A. l. spodionotus*) was noted by García-Moreno & Fjeldså (1999). We further reveal no significant intra-group differences in morphometrics (Appendix 2). Apparent intermediates between *A. l. comptus* and *A. l. spodionotus* are known from southern Ecuador and northern Peru (Ridgely & Greenfield 2001, Vellinga *et al.* 2004), suggesting a close relation between these taxa. Some morphological characters which vary within *A. latinuchus* are probably unreliable for delimiting species (Remsen & Graves 1995a). Presence or absence of a speculum is one case, having been reported as variously present and absent within the same population (Vellinga *et al.* 2004), and an apparent intergrade *A. s. tamae* / *A. s. schistaceus* (MLS 7552) had a speculum on one wing but not the other. Likewise, reported *A. l. comptus* / *A. l. spodionotus* intermediates and the surprising placement of some *A. pallidinucha* taxa in the *A. latinuchus* clade in the molecular phylogeny suggest that a paler nape is also somewhat plastic.

Our analyses point to a clear anomaly in the current sequence (the placement of *A. l. nigrifrons* within *A. latinuchus*). The position of this taxon, discussed further below, can confidently be dealt with at this time in the light of the morphological data presented herein. However, a more substantial reappraisal of the *A. latinuchus* complex would be premature in advance of Klicka *et al.*'s more comprehensive molecular analysis. We have therefore described *A. l. yariguierum* as a subspecies within the *A. latinuchus* complex. However, we strongly suspect that some taxa or groups of taxa within this complex represent species under the Biological Species Concept (Helbig *et al.* 2002) and that most of them represent species under a phylogenetic species concept (Cracraft 1983).

Before turning to the case of *A. l. nigrifrons*, its taxonomy requires comment. *A. l. nigrifrons* was described by Phelps & Gilliard (1940), but the name was subsequently changed to *A. l. phelpsi* by Paynter (1970) as the subspecific epithet was preoccupied by *A. torquatus nigrifrons*. However, with *A. torquatus* now assigned to *Buarremon* (see Hackett 1993, Remsen & Graves 1995a,b, and followed by almost all recent authors), *phelpsi* becomes a junior synonym of *nigrifrons* (Dickinson 2004).

The clade including *A. l. nigrifrons*, *A. melanocephalus* and the Perijá bird was the best supported of our northern taxa phylogeny. *A. melanocephalus* and *A. l. nigrifrons* would therefore, provisionally, appear to be more closely related to one another than either is to any of the *A. latinuchus* taxa, a proposition supported by biogeographical and morphological evidence. *A. l. nigrifrons* and *A. melanocephalus* are both restricted to the northernmost Colombian and Venezuelan mountains: the Perijá and Santa Marta ranges. Studies by Remsen & Graves (1995a) and García-Moreno & Fjeldsa (1999) suggest that some geographically close but morphologically distinctive *Atlapetes* taxa are more closely related to one another than they are to superficially similar but more geographically distant taxa. Paynter (1978) drew attention to the morphological similarity of *A. l. nigrifrons* (then *A. l. phelpsi*) and *A. melanocephalus*, which share a black forehead (with *A. melanocephalus* possessing an entirely black crown), black chin, lack of pale moustachial markings (the malar merging with the mask), distinctly greyish cheeks and a paler grey back, features not found in northern *A. latinuchus* taxa. A lineage extending from *A. a. albofrenatus* (green back; moustachial stripe; black forehead; red crown), through the Perijá bird (green back; moustachial merging with malar; black forehead; red crown) and *A. l. nigrifrons* (grey back; moustachial merging with malar; black forehead; red crown) to *A. melanocephalus* (grey back; moustachial merging with malar; black forehead; black crown), although not supported by our phylogenetic analysis, wherein *A. albofrenatus* taxa behaved counter-intuitively, appears a more plausible hypothesis than any close relation between *A. l. nigrifrons* and northern *A. latinuchus* taxa.

The assignment of *A. l. nigrifrons* to the *A. latinuchus* species-group appears to be a clear example of the current sequence failing to reflect natural groupings, per García-Moreno & Fjeldså (1995). If not assigned species rank, a better placement for *nigrifrons* is in either *A. melanocephalus* or *A. albofrenatus*. Other possible approaches, lumping *A. melanocephalus* and/or *A. albofrenatus* within *A. latinuchus*, defy rationale. Significant morphological differences exist between northern *A. latinuchus*, *A. l. nigrifrons*, *A. melanocephalus* and *A. albofrenatus*, and are considerably greater than those between various southern forms now treated specifically. Under a modernised Biological Species Concept (Helbig *et al.* 2002) and given almost certain paraphyly of *A. latinuchus*, we consider that *A. l. nigrifrons* is better treated specifically. The status of this taxon under a phylogenetic species concept should also be beyond doubt. Perijá Brush-finch is an appropriate vernacular name for *A. nigrifrons*.

Finally, it merits further consideration that *A. albofrenatus* was not monophyletic in our analysis. The close resemblance of *A. a. albofrenatus* to *A. schistaceus* was discussed previously (Remsen & Graves 1995a). In our majority rule and Adams consensus trees, *A. a. albofrenatus* grouped with the five *A. schistaceus* taxa and not *A. a. meridae*. The lack of a very close relationship between *A. a. meridae* and *A. a. albofrenatus* was further supported by morphometric data: *A. a. albofrenatus* averages larger in both wing- and tail-length than *A. a. meridae* (Appendix 2; *cf.*

Paynter (1978) who considered that 'no difference in size is apparent' between these taxa). No contact zone is known between them, *A. a. albofrenatus* being restricted to the Eastern Andes of Colombia and *A. a. meridae* to the Mérida Mountains of Venezuela. Despite morphological differences between them, we suspect that *A. a. albofrenatus* is indeed the closest extant relative of *A. a. meridae* (though the converse may not be true given the probable link between *A. a. albofrenatus*, the Perijá bird and *A. l. nigrifrons*, and possible links between *A. a. albofrenatus* and *A. schistaceus*). *A. a. albofrenatus* and *A. a. meridae* are morphologically more dissimilar (both in plumage and biometrics) than other closely related *Atlapetes* taxa now treated specifically (following García-Moreno & Fjeldså 1995). They surely represent species under a phylogenetic species concept and quite probably under the Helbig *et al.* (2002) interpretation of the Biological Species Concept. However, insufficient evidence exists to suggest that *A. albofrenatus* is paraphyletic, and an analysis of genetic and/or vocal data is lacking.

Conservation

A. l. yariguierum is endemic to the Colombian East Andes EBA (038: Stattersfield *et al.* 1998). It technically qualifies for IUCN Category D2 Vulnerable status due to its Area of Occupancy being less than 100 km^2 and being certainly known from fewer than five localities. However, if confirmed at all of the additional localities mentioned above, its status would be Near Threatened. Extensive field work in the main Cordillera in dptos. Santander and (particularly) Boyacá during the past 50 years have yielded just a handful of specimens. The taxon appears to be somewhat rare even in primary habitat. Despite specific searches, field work at the type locality produced just one capture and no observations, and, at Lepipuerto, just one sighting and no captures. At our páramo site on the east slope of the Yariguíes range, it was more common, being observed daily. Like other members of the *A. latinuchus* group (Hilty 2003), the new taxon appears to tolerate secondary habitats and may be more numerous in these than in primary forest.

Protected areas in the Eastern Andes (e.g. Parques Nacionales Naturales Pisbe, El Cocuy, Tamá, Sumapaz, Chingaza, Los Picachos, Alto Fragua, Indi-Wasi and Catatumbo) are concentrated in the highest páramos or on the east slope, and all are subject to varying levels of deforestation and human occupancy. Serranía de los Yariguíes, one of the last forest wildernesses within this Critical-rated EBA (Stattersfield *et al.* 1998), was for 24 years subject to a 'conservation plan'. Following our work and with the impetus of the Ministerio de Medio Ambiente, Corporación Autónoma Regional de Santander (CAS), various mayoralties of the region and NGOs, the Serranía de los Yariguíes National Park was finally declared on 16 May 2005. The new protected area should assist in conserving *A. l. yariguierum* and other threatened birds including Black Inca *Coeligena prunellei*, *Odontophorus strophium*, *Macroagelaius subalaris* and Saffron-headed Parrot *Pionopsitta pyrilia* (Donegan *et al.* 2005, Donegan & Huertas 2005, Huertas & Donegan 2006).

Comments on brush-finch vernacular names

García-Moreno & Fjeldså (1999) suggested the English names 'Northern Rufous-naped Brush-finch' for *A. latinuchus* and 'Bolivian Rufous-naped Brush-finch' for *A. rufinucha*. However, 'Northern Rufous-naped Brush-finch' scarcely befits *A. latinuchus*, given that at least two taxa in the group (*A. l. baroni* and *A. l. chugurensis*) have white or cream napes, and that this name incorrectly implies *A. rufinucha* to be its sister species. Further, rufous-naped is a translation of the Latin species epithet of *A. rufinucha*, not *A. latinuchus*. The name 'Cloud-forest Brush-finch' was also recently proposed (Clements & Shany 2001), but *A. latinuchus* is one of many *Atlapetes* species found in such zones and *A. l. baroni*, *A. l. caucae* and *A. l. chugurensis* are not restricted to cloud forests. Given this, J. V. Remsen *in* Dickinson (2003) proposed a third name, 'Yellow-breasted Brush-finch', which is consistent with the plumage of all group members and distinguishes it from some *Atlapetes*, but not from many others, e.g., Dusky-headed Brush-finch *A. fuscoolivaceus*, Yellow-headed Brush-finch *A. flaviceps*, Tricoloured Brush-finch *A. tricolor* or Moustached Brush-finch *A. albofrenatus*, and also has the potential to confuse with Yellow-throated Brush-finch *A. gutturalis*. 'Cloud-forest Brush-finch' and 'Northern Rufous-naped Brush-finch' were both rejected by the AOU South American Checklist Committee. None of the English names proposed to date is particularly satisfactory, reflecting the lack of unifying plumage characters for *A. latinuchus* and that the group almost certainly contains several biological and multiple phylogenetic species. 'Yellow-breasted Brush-finch', whilst not ideal, was recently adopted by the AOU South American Checklist Committee (Remsen *et al.* 2006). Doubtless a new suite of vernacular names will become necessary when *A. latinuchus* is, almost inevitably, split. The English name proposed herein for *A. l. yariguierum* is proposed only as a name for this taxon and not to any larger grouping (e.g. with *A. l. elaeoprorus* and/or *A. l. spodionotus*).

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APPENDIX 1

Specimens examined.

A. fuscoolivaceus: IAVH 7870, 11782, 11801; ICN 3169, 27333, 27336, 27370.

A. melanocephalus: NHM 1885.6.8.125, 1885.6.8.452; IAVH 558, 944, 966, 2056–2058, 2064, 2067, 2240, 3085, 11300, 11311; ICN 23504–23515, 21690; MLS 7505

A. latinuchus baroni NHM unnumbered, 1896.10.6.228, 1896.10.6.229

A. latinuchus caucae ICN 3179, 3350, 19814, 25661, 25934, 25935, 26069, 29016, 29748, 29758, 29804, ; MLS 7530, unnumbered; MNHN 2374 (NB: only Colombian *A. latinuchus* group specimens inspected in detail at MNHN).

A. latinuchus comptus NHM 1883.6.12.930, 1885.6.8.149.

A. latinuchus elaeoprorus NHM 1885.6.8.150, 1885.6.12.931; IAVH 2263, 2310, 11699; ICN 20169, 34701; MLS 7528, 7530, 7870; MNHN 2375, 3754.

A. l. latinuchus NHM 1885.6.12.926, 1896.10.6.230–1896.10.10.233, 1900.10.2.93, 1924.2.14.22, 1924.2.14.23, 1953.68.464.

A. [*latinuchus*] *nigrifrons* ICN 32692; COP (photo) 55881, 55882, 55890, 55900, 55902, 55905, 58251, 73053, 73323, 73326, 73333, 73337; ICN 32646 ('Perijá bird').

'*A. latinuchus simplex*' (= *A. l. spodionotus*) NHM 1893.12.12.18.

A. latinuchus spodionotus NHM 1860.11.9.9, 1860.11.20.83, 1885.6.147, 1885.6.8.148, 1885.6.12.928, 1885.6.12.929, 1900.10.2.87, 1900.10.2.88, 1925.12.24.283, 1925.12.24.284, 1938.12.20.122, 1940.12.5.117–1940.12.5.120, 1940.12.5.214, 1940.12.5.960, 1940.12.5.961, 1969.52.520, 1969.52.521, 1977.5.7–1977.5.11; UMZC 27/Fri(E)/8/r/1–27/Fri(E)/8/r/4; ICN-UN 33355; MLS 7531, 7532, MNHN 2376.

A. latinuchus yariguierum ICN 3199, 10322, 25111, 34016 (holotype); UIS 1412; FMNH (photo) 220606, 220607.

A. a. albofrenatus NHM 1885.6.8.152, 1885.6.8.153, 1885.6.12.932, 1885.6.12.933, 1916.9.21.141; IAVH 612, 6543, 10301, 11678, 12551; MLS 7533–7536; ICN 3171–3177, 3560, 3701, 3706, 3721, 3974, 4217, 4819, 4820, 5068, 10323, 14712, 15938, 16250, 16358, 18847, 25280, 25497, 28356, 28357, 18846, 18848, 31126, 34982; UIS 1433.

A. albofrenatus meridae NHM 90.5.15.1, 1914.11.26.673-1914.11.26.676, 1914.11.26.680, 1969.39.77, 1969.39.76, 1969.52.519.

A. schistaceus castaneifrons NHM 12.18.070, 12.204.94, 85.6.8.160, 85.6.8.161, 85.6.12.941, 1914.11.26.484, 1914.11.26.67, 1914.11.26.679, 1914.41.26.680–1914.11.26.683, 1914.11.26.685–1914.11.26.687, 1915.3.1.177, 1915.3.1.678, 1969.39.78–1969.39.80.

A. schistaceus fumidus ICN 4851, 4852.

A. s. schistaceus NHM 1845.5.24.30, 1854.1.25.100, 1857.11.28.59, 1885.6.8.156–1885.6.8.159, 1885.6.8.162, 1885.6.12.934, 1885.6.12.935, 1885.6.12.938, 1898.12.14.654–98.12.14.657, 1916.9.21.94, 1916.9.21.95, 1946.49.696, 2002.3.1044–1946.49.698; UMZC 27/Fri(E)/8/5/1–27/Fri(E)/8/5/3; IAVH unnumbered (2), 5387, 6714, 7257, 7260, 7267, 11845, 12287, 12627, 12646; MLS 7546–7548, 7550, 7551, 7553, 8245; ICN 4296–4302, 4304–4306, 4840, 4849, 4855–4864, 4866–4869, 4871–4884, 14655, 19015, 20010–20013, 20446, 22330–22332, 26220, 26234, 33709, 35012, 437125.

A. schistaceus tamae IAVH 10628, 10632, 10643, 10652, 12102, 12105; MLS 7537–7545; ICN 4853, 4854, 10681, 33936; UIS 1252.

A. canigenis NHM 1939.1.30.1.

A. r. rufinucha NHM 1846.9.9.99, 1846.99.136, 1885.4.8.144, 1885.6.8.142, 1885.6.8.143, 1885.6.8.148, 85.6.12.922–1885.6.12.924, 1902.313.334.
A. melanolaemus NHM 1902.3.13.335–1902.3.13.339.

APPENDIX 2

Biometrics of *Atlapetes* taxa.

Taxon	Sex	Wing	Tail	Tarsus	Bill	Mass
A. fuscoolivaceus	all	74.0 ± 3.4 (7)	78.4 ± 4.9 (7)	26.6 ± 0.7 (6)	16.4 ± 0.6 (5)	32.5 ± 1.5 (2)
	males	75.6 ± 2.1 (5)	80.0 ± 5.5 (5)	26.8 ± 0.9 (4)	16.7 ± 0.8 (3)	32.5 ± 1.5 (2)
	females	67.0 ± 0.0 (1)	73.0 ± 0.0 (1)	26.0 ± 0.0 (1)	16.0 ± 0.0 (1)	
A. melanocephalus	all	72.2 ± 3.5 (26)	74.0 ± 3.2 (24)	26.1 ± 1.0 (27)	16.0 ± 0.6 (24)	25.0 ± 2.8 (6)
	males	72.8 ± 4.5 (10)	76.0 ± 3.5 (10)	26.2 ± 1.1 (10)	15.9 ± 0.5 (8)	23.8 ± 2.5 (2)
	females	71.3 ± 2.4 (12)	72.2 ± 2.2 (11)	26.1 ± 0.8 (12)	16.0 ± 0.7 (12)	25.8 ± 3.75 (3)
A. latinuchus baroni	all	73.0 ± 0.0 (3)	76.7 ± 2.5 (3)	28.0 ± 0.5 (3)	15.5 ± 0.0 (3)	
	males	73.0 ± 0.0 (1)	79.0 ± 0.0 (1)	28.5 ± 0.0 (1)	15.5 ± 0.0 (1)	
	females	73.0 ± 0.0 (2)	75.5 ± 2.1 (2)	27.8 ± 0.4 (2)	15.5 ± 0.0 (2)	
A. latinuchus caucae	all	71.5 ± 2.1 (12)	72.3 ± 2.7 (12)	26.4 ± 1.1 (12)	15.3 ± 0.8 (11)	
	males	72.2 ± 2.4 (5)	73.6 ± 2.7 (5)	26.2 ± 1.5 (5)	15.4 ± 0.9 (5)	
	females	71.0 ± 1.9 (7)	71.3 ± 2.4 (7)	26.5 ± 0.8 (7)	15.2 ± 0.7 (6)	
A. latinuchus comptus	all	74.0 ± 1.4 (2)	74.5 ± 0.7 (2)	27.5 ± 0.7 (2)	15.5 ± 0.0 (2)	
A. latinuchus elaeoprorus	all	75.9 ± 3.7 (10)	73.7 ± 4.4 (11)	27.1 ± 0.7 (11)	15.9 ± 0.5 (12)	27.5 ± 0.0 (1)
	males	75.5 ± 3.5 (2)	74.5 ± 2.1 (2)	27.0 ± 0.0 (3)	16.2 ± 0.3 (3)	27.5 ± 0.0 (1)
	females	72.5 ± 4.9 (2)	69.0 ± 2.8 (2)	26.5 ± 0.7 (2)	16.0 ± 0.7 (2)	
A. l. latinuchus	all	72.6 ± 3.5 (9)	71.1 ± 3.4 (9)	26.0 ± 0.9 (8)	15.6 ± 0.4 (8)	
	males	73.8 ± 4.1 (5)	73.2 ± 2.8 (5)	26.3 ± 1.0 (5)	15.6 ± 0.5 (4)	
	females	71.0 ± 2.0 (3)	68.5 ± 2.1 (3)	25.5 ± 0.5 (3)	15.6 ± 0.3 (4)	
A. latinuchus nigrifrons	all	69.6 ± 3.3 (15)	71.0 ± 3.6 (15)	25.5 ± 0.0 (1)	15.9 ± 0.5 (3)	31.0 ± 0.0 (1)
	males	70.3 ± 4.1 (6)	73.7 ± 3.8 (6)			
	females	68.9 ± 2.7 (9)	69.7 ±2.2 (9)	25.5 ± 0.0 (1)	16.0 ± 0.0 (1)	
'Perijá bird'	all	72.0 ± 1.4 (2)	76.3 ±1.8 (2)	26.0 ± 0.0 (1)	15.3 ± 1.0 (2)	28.5 ± 0.7(2)
	females	73.0 ± 0.0 (1)	77.5 ±0.0 (1)	26.0 ± 0.0 (1)	16.0 ± 0.0 (1)	29.0 ± 0.0(1)
'*A. latinuchus simplex*'	all (=male)	78.0 ± 0.0 (1)	77.0 ± 0.0 (1)	27.0 ± 0.0 (1)	(broken)	
A. latinuchus spodionotus	all	75.9 ± 3.4 (29)	75.2 ± 5.1 (28)	26.9 ± 1.1 (28)	15.7 ± 0.5 (28)	
	males	76.4 ± 3.4 (17)	76.3 ± 5.2 (17)	26.7 ± 1.1 (18)	15.6 ± 0.5 (18)	
	females	74.9 ± 4.3 (7)	73.9 ± 5.7 (7)	27.4 ± 0.5 (6)	16.0 ± 0.4 (5)	
A. latinuchus yariguierum	all	75.3 ± 2.1 (3)	78.3 ± 1.5 (3)	27.0 ± 1.7 (3)	16.0 ± 0.0 (3)	22.6 ± 0.0 (1)
	males	77 ± 0.0 (1)	80 ± 0.0 (1)	25.0 ± 0.0 (1)	16.0 ± 0.0 (1)	22.6 ± 0.0 (1)
	females	76 ± 0.0 (1)		78± 0.0 (1)	28.0 ± 0.0 (1)	16.0 ± 0.0 (1)
A. a. albofrenatus	all	72.9 ± 2.4 (36)	73.9 ± 3.5 (37)	26.2 ± 1.0 (36)	15.9 ± 0.5 (36)	30.0 ± 2.6 (6)
	males	74.2 ± 2.6 (17)	75.2 ± 2.9 (18)	26.1 ± 1.1 (18)	16.0 ± 0.6 (18)	29.0 ± 1.2 (4)
	females	71.8 ± 1.6 (10)	72.6 ± 3.0 (10)	25.8 ± 0.8 (9)	15.9 ± 0.5 (10)	32.0 ± 4.2 (2)
A. albofrenatus meridae	all	67.2 ± 2.4 (9)	68.0 ± 2.9 (9)	26.5 ± 1.2 (8)	15.7 ± 0.7 (9)	
	males	68.0 ± 1.7 (3)	69.0 ± 1.0 (3)	26.7 ± 0.8 (3)	15.7 ± 0.3 (3)	
	females	63.0 ± 0.0 (1)	65 ± 0.0 (1)	25.0 ± 0.0 (1)	16.5 ± 0.0 (1)	
A. schistaceus castaneifrons	all	70.5 ± 3.0 (18)	73.0 ± 4.2 (18)	27.3 ± 1.0 (18)	15.7 ± 0.5 (17)	
	males	70.9 ± 3.0 (13)	73.7 ± 4.3 (13)	27.4 ± 0.8 (13)	15.8 ± 0.5 (12)	
	females	69.3 ± 4.0 (3)	71.3 ± 3.1 (3)	27.9 ± 0.8 (3)	15.7 ± 0.8 (3)	
A. schistaceus fumidus	all	72.5 ± 3.5 (2)	72.5 ± 2.1 (2)	27.3 ± 0.4 (2)	15.8 ± 0.4 (2)	
	males	75.0 ± 0.0 (1)	74.0 ± 0.0 (1)	27.5 ± 0.0 (1)	16.0 ± 0.0 (1)	
	females	70.0 ± 0.0 (1)	71.0 ± 0.0 (1)	27.0 ± 0.0 (1)	15.5 ± 0.0 (1)	
A. s. schistaceus	all	75.5 ± 3.3 (81)	77.5 ± 4.5 (82)	26.8 ± 0.9 (83)	15.0 ± 0.6 (81)	28.2 ± 2.6 (11)
	males	78.0 ± 2.2 (26)	80.3 ± 3.0 (25)	27.0 ± 0.7 (25)	15.0 ± 0.5 (23)	28.5 ± 1.3 (4)
	females	74.3 ± 2.6 (28)	76.4 ± 3.4 (27)	26.7 ± 0.8 (29)	15.2 ± 0.7 (30)	
A. s. schistaceus	all	76.1 ± 3.1 (46)	78.7 ± 3.7 (45)	26.8 ± 0.8 (48)	15.1 ± 0.5 (46)	28.0 ± 3.0 (8)
Eastern Andes	males	78.0 ± 2.2 (20)	80.2 ± 3.2 (19)	27.0 ± 0.8 (20)	15.0 ± 0.5 (18)	28.0 ± 1.0 (3)

	females	74.6 ± 2.4 (19)	76.7 ± 2.9 (18)	26.5 ± 0.6 (20)	15.2 ± 0.7 (21)	27.8 ± 5.5 (3)
A. s. schistaceus	all	77.0 ± 2.5 (12)	79.4 ± 3.1 (12)	26.7 ± 0.9 (10)	15.2 ± 0.7 (10)	28.8 ± 1.0 (3)
Western and Central Andes	males	78.6 ± 2.5 (5)	81.3 ± 2.9 (5)	27.0 ± 0.4 (4)	15.1 ± 0.8 (4)	30.0 ± 0.0 (1)
	females	75.0 ± 2.0 (3)	78.7 ± 3.5 (3)	25.8 ± 1.2 (3)	15.0 ± 1.0 (3)	
A. schistaceus tamae	all	74.5 ± 2.9 (17)	74.8 ± 3.0 (18)	27.4 ± 0.8 (18)	15.7 ± 0.6 (15)	26.4 ± 1.5 (7)
	males	75.9 ± 2.0 (9)	76.0 ± 2.0 (10)	27.4 ± 0.6 (10)	15.8 ± 0.5 (9)	27.3 ± 1.5 (4)
	females	73.8 ± 4.2 (4)	72.8 ± 4.6 (4)	27.5 ± 1.1 (4)	15.5 ± 0.5 (3)	26.0 ± 0.0 (1)
A. canigenis	unknown	69.0 ± 0.0 (1)	68.0 ± 0.0 (1)	27.5 ± 0.0 (1)	17.0 ± 0.0 (1)	
A. r. rufinucha	all	69.1 ± 4.1 (10)	64.6 ± 4.4 (10)	25.9 ± 1.0 (10)	15.0 ± 0.7 (10)	
	females	68 ± 0.0 (1)	62 ± 0.0 (1)	25 ± 0.0 (1)	14.0 ± 0.0 (1)	
A. melanolaemus	all	68.8 ± 2.9 (6)	67.8 ± 3.8 (6)	27.2 ± 0.5 (6)	15.0 ± 0.7 (6)	
	males	71.5 ± 2.1 (2)	71.0 ± 4.2 (2)	27.3 ± 0.4 (2)	15.0 ± 1.4 (2)	
	females	67.0 ± 2.6 (3)	65.7 ± 3.1 (3)	27.2 ± 0.8 (3)	15.0 ± 0.5 (3)	

APPENDIX 3

Matrix of characters and description of characters used in phylogenetic analysis

Taxon | Character	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
B. brunneinucha (outgroup)	2	0	0	2	0	0	1	2	0	4	0	1	1	1	0	1
A. fuscoolivaceus	1	0	2	1	0	0	1	0	0	4	0	0	0	0	1	1
A. t. tricolor	1	0	1	2	0	0	1	0	0	4	0	0	0	0	1	1
A. tricolor crassus	1	0	1	2	0	0	1	0	0	4	0	0	1	0	1	1
A. melanocephalus	1	0	2	0	0	0	0	2	1	0	2	0	0	0	2	0
Perijá bird	1	0	0	2	0	0	0	2	0	0	1	0	0	0	0	0
A. latinuchus baroni	1	1	0	0	0	1	1	0	0	2	0	0	0	0	0	1
A. latinuchus caucae	1	0	0	0	1	1	1	0	0	3	0	0	0	0	0	1
A. latinuchus chugurensis	1	1	0	0	0	1	1	0	0	3	0	0	0	0	0	1
A. latinuchus comptus	1	1	0	0	0	2	1	0	0	2	0	0	0	0	0	1
A. latinuchus elaeoprorus	1	0	0	0	1	1	1	0	0	3	0	0	0	0	0	1
A. l. latinuchus	1	0	0	0	1	1	1	0	0	2	0	0	0	0	0	1
A. latinuchus nigrifrons	1	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0
A. latinuchus simplex	1	0	0	0	0	1	1	0	0	3	0	0	0	0	0	1
A. latinuchus spodionotus	1	0	0	0	0	1	1	0	0	3	0	0	0	0	0	1
A. latinuchus yariguierum	1	0	0	0	0	0	1	0	0	3	0	0	0	0	0	1
A. a. albofrenatus	1	0	0	2	0	0	1	1	0	0	0	0	0	0	1	1
A. albofrenatus meridae	1	0	0	2	0	0	1	2	0	2	0	0	0	0	0	1
A. schistaceus castaneifrons	0	0	0	0	0	1	1	0	0	0	0	0	?	0	1	1
A. schistaceus fumidus	0	0	0	0	0	1	1	0	0	0	0	0	?	0	1	1
A. s. schistaceus	0	0	0	0	1	2	1	1	0	0	0	0	?	0	1	1
A. schistaceus taczanowskii	0	0	0	0	0	2	1	1	0	0	0	0	?	0	1	1
A. schistaceus tamae	0	0	0	0	0	0	1	1	0	0	0	0	?	0	1	1
A. canigenis	0	0	0	0	0	0	1	1	1	?	0	0	?	0	0	1
A. r. carrikeri	1	0	0	1	0	0	1	1	0	1	0	0	1	0	0	1
A. r. rufinucha	1	0	0	0	0	2	1	1	0	1	0	0	1	0	0	1
A. melanolaemus	1	0	0	0	0	0	0	1	1	?	0	0	1	0	2	0

Matrix of plumage characters. 1. Belly (0=grey, 1=yellow, 2=white); 2. Pale nape (0=absence, 1=presence); 3. Crown (0=rufous, 1=tawny/yellowish, 2=neither rufous nor tawny); 4. Olivaceous on back (0=none, 1=tinge, 2=deep olive / green); 5. Visible speculum (0=absence, 1=presence); 6. Supraloral spot (0=none/vestigial, 1=small, 2=large); 7. Chin (0=black, 1=as breast or whiter); 8. Forehead (0=rufous/tawny, 1=narrow black, 2=broad black); 9. Mottling on breast (0=absence, 1=presence); 10. Dark malar (0=thick, 1=strong, 2=moderate, 3=faint, 4=none); 11. Cheeks (0=black/as mask, 1=dark grey, 2=pale grey); 12. Breast-band (0=absence, 1=presence); 13. Melanism of flanks (0=light, 1=strong); 14. Orange supercilium (0=absence, 1=presence); 15. Throat and upper breast (0=homogeneous with belly, 1=distinctly lighter, 2=distinctly darker); 16. Paler moustachial region (0=absent, 1=present).

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Notes on Waterfall Swift *Hydrochous gigas*: I. Occurrence and nesting

by Jan-Hendrik Becking

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Waterfall Swift *Hydrochous gigas* (originally Giant Swiftlet *Collocalia gigas*) was described from a female taken by A. L. Butler, in 1900, at Semangkok (=Gap) Pass, at *c.*820 m, in Selangor, central Peninsular Malaysia (03°42'N, 101°45'E) (Hartert & Butler 1901). On 2 October 1900, M. E. G. Bartels collected another specimen, at Pasir Datar (06°46'S, 106°56'E), on the south-west slope of Mt Pangrango, western Java (Finsch 1901, 1902, Bartels 1906), where it was not particularly rare (Bartels 1915). Its distribution on Java is apparently restricted to the western part, with no sight records from central or eastern Java. The easternmost locality where it has been observed is the Kole Beres tea estate (*c.*07°12'S, 107°17'E), on the southern slope of Mt Patuha (Bartels 1931). For Sumatra, the first records were two specimens (male and female) taken by E. Jacobson in the Solok Mountains, Padang Highlands (*c.*00°48'S, 100°39'E), in July 1914 (Robinson & Kloss 1924). These are the only specimens from Sumatra, although there are sight records from Mt Kerenci (*c.*01°47'S, 101°13'E), Mt Leuser National Reserve (*c.*03°45'S, 97°10'E) and elsewhere (Van Marle & Voous 1988). In Borneo, *H. gigas* is known only from sight records, some insufficiently documented (Smythies 1999).

The species' biology is poorly understood, its behaviour unstudied, and no accurate population counts at individual colonies available. It is considered Near Threatened due to the probably small population and apparent disappearance from certain localities (Chantler 1999, Chantler & Driessens 2000, BirdLife International 2001). I studied the Waterfall Swift in the field, at its breeding sites, paying special attention to behaviour and breeding. The present paper describes the nesting habits of the Waterfall Swift.

My original aim was to monitor a nesting site at the foot of Mt Gagak, near the Mt Halimun complex in western Java, sited in a cave below a riverbed, with three large boulders forming a 'roof' and a small waterfall at its front, in the River Cisekati (Becking 1971). The site was first discovered by the Bartels family in 1922 and monitored by them until *c.*1939. It was no longer used in 1971, when I revisited the site, probably due to heavy deforestation in the environs. In October–December 1971 and 1977 I searched for other nesting sites in western Java, along a number of montane rivers deemed suitable for the species.

Nesting sites

A total of seven nesting localities was discovered on three mountains in western Java: on Mt Pangrango-Gede (3,019 m), Mt Salak (2,211 m) and in the Mt Halimun complex (1,370–1,929 m). The species appeared widespread on these mountains,

especially where their specific biotope requirements were available. Nearly all nesting sites were near waterfalls or along rivers close by, in areas of submontane or montane, usually primary, forest far from any human activity.

At a locality with nesting swifts, two types of nest sites were usually distinguished. Nests of the first or main type, *c.*80–90% of the total number observed, were at the waterfall itself. The fall was usually in a rather open situation, often within primary forest, and large water masses fell steeply from a rock outcrop, producing a fall of considerable height. In such cases, nests were placed in small niches within the rock walls near the top of the fall, close to or even behind the water 'curtain', or beside of the fall (Fig. 1). Usually, nests at each site numbered 5–8, rarely more.

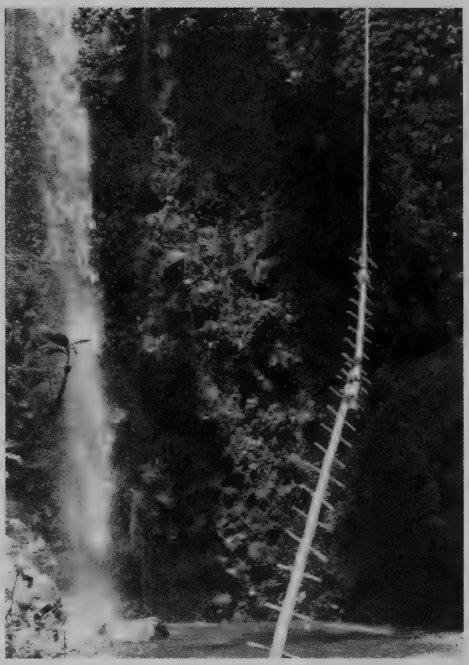

Figure 1. Waterfall in the River Cicewol, on the south side of Mt Salak, western Java. The vertical rock wall beside the water 'curtain' contains Waterfall Swift *Hydrochous gigas* nests. Note the primitive ladder used to examine the nests (Jan-Hendrik Becking)

The second type, numbering *c.*10–20% of the total number of nests, were in nearby narrow gorges or ravines, where rapid streams or rivulets formed small cascades of water. The nests were beside the same river as the waterfall or on a nearby tributary, some just 20–30 m from the main waterfall site, and were placed in holes or niches in the vertical earth or rock wall, one to several metres above the stream and often 3–15 m apart. In such situations, nests were not directly exposed to water spray or seepage. Such nests were perhaps second-choice sites, and the number at each locality usually varied from one to four. At the well-studied Cicewol, Mt Salak site (see below), for instance, in 1977–78 there were two additional nests besides the *c.*7–8 nests at the fall: one 20 m downstream, and the other 10 m upstream, of the fall.

I also found nests, singly or clumped 2–3, widely spaced and with no apparent association to any colony. These were sited along fast-running currents or rivulets within dense primary forest in the same regions.

Study site

A nesting site below a relatively low waterfall (25 m) in the River Cicewol (06°46'S, 106°56'E), on the south side of Mt Salak at *c.*1,100–1,200 m, was

Figure 2. Nest of Waterfall Swift *Hydrochous gigas* containing an egg near the crest of Cicewol waterfall, Mt Salak. It is partially sited below the water curtain of the fall as can be noted from the vertical streams of water in front of the nest (Jan-Hendrik Becking)

selected for more detailed observations. At this site, the river dropped from a vertical, east-facing rock surface, forming a waterfall with a pool below. The walls around the fall were clad in a short vegetation of ferns (particularly Hymenophyllaceae), hydrophilic dicotyledons (mainly Urticacea, *Elatostema* spp.), mosses (bryophytes) and liverworts. The site was slightly shaded by overhanging trees above and exposed to direct sunlight for only a few hours per day. Approximately 7–8 nests were sited near the top of the waterfall, below, behind or close to the water 'curtain', on ledges and in holes within the vertical rock and side walls of the fall. To closely examine the nests, bamboo ladders and scaffolds were constructed (Fig. 1), which were removed immediately following nest inspection to minimise disturbance. Construction, nest inspection and dismantling took *c*.2–3 hours for 50% of the nests, with the other half examined the following day. Ambient temperature at the site was *c*.15°C in the early morning, rising to 25°C at noon on sunny days with no cloud and falling to *c*.9–12°C at night. Relative humidity was close to saturation (96–100%).

Observations

Seven nests were discovered at the Cicewol site on 30 October–5 November 1977. They were located in the crescent-shaped andesitic rock surrounding the fall. More nests may have been present, as I subsequently found the remnants of a fresh egg in the pool, apparently from a nest not detected earlier. On 12 November I returned with my Indonesian assistants to closely examine the nests. Three nests near the top of the fall, close to or behind the water, were inaccessible and therefore not examined. Two of these possibly had young, from observations with binoculars. The other was too deep within a crevice to determine its contents. The four lower nests, at *c*.8–16 m, were examined: two each had a single egg at different stages of incubation, one fresh, the other hard-set; the third appeared to be under construction or repair, as fresh green moss and liverworts had recently been added to its rim; and the fourth nest held a very young nestling. Nest inspection was repeated on 20 and 27 November, permitting description of the plumage development (see Part II). Heavy rainfall caused the water flow to approximately double by the 20th, with large tree stems and branches coming over the falls, and forcing me to abandon my camp site close to the river.

Figure 3. Close-up of the same nest as in Fig.2 (Jan-Hendrik Becking)

In 1978 I returned to the same site in September–October. The same number of nests (7–8) was present. A notable degree of nest fidelity was found, as *c*.50% of the 1977 nests were occupied. Although this visit was earlier in the season than in 1977, breeding had commenced and the nests were at different stages. Of the six lower nests examined, one had a single hard-set egg, one a very recently hatched nestling, three a small chick at various stages of development, and the last an older, feathered nestling.

I continued to monitor this site subsequently, in 1982 (May–August), 1983 (June–August), 1987 (September–November), 1989 (March–April), 1990 (July–August), 1992 (May–July), 1994 (March–May), 1997 (April–May) and 2001

Figure 4. Nest of Waterfall Swift *Hydrochous gigas* of the second type, i.e. not directly associated with a waterfall, but placed in the earth wall along the bed of a rapid rivulet, Mt Pangrango, western Java (Jan-Hendrik Becking)

(July–August). During these visits—especially during the breeding season—I usually restricted myself to estimating the number of birds present and counting the nests visible from below. Prior to 1992 the nesting site was still intact and appeared to be occupied by the same number of pairs. By 1997, however, deforestation had commenced upstream nearby, and there was increased human activity. When I visited in 2001 I found the environment even more degraded by logging. Swifts were still present, albeit just *c*.2–3 pairs. Their continued presence indicates a high nest-site fidelity, as is known in other swift species.

Nesting habitat and conservation status

During the search for nesting sites of Waterfall Swift in 1977, the species appeared widespread on the three mountains investigated. Main nesting sites appeared to be sited at waterfalls in montane rivers within primary forest, whilst secondary nesting sites were in narrow river gorges. The preference for undisturbed forest areas was confirmed by developments at the Cicewol site, where degradation of the surrounding forest was coincident with a reduction in Waterfall Swift numbers. Given the rate of deforestation even in montane areas within the species' range and the swift's apparent fidelity to breeding sites, its conservation status is cause for

concern. A thorough investigation of its past and present occurrence may lead to its being classified as Vulnerable; see also BirdLife International (2001). At some colonies unscrupulous collectors may also be a threat.

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Notes on Waterfall Swift *Hydrochous gigas*: II. Nestling plumage and phylogenetic relationships

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Waterfall Swift *Hydrochous gigas* occurs in montane Peninsular Malaysia, Sumatra, Java and possibly Borneo (see Part I, pp. 117–122). Originally placed in *Collocalia* (Hartert & Butler 1901), its taxonomic position is, however, still debated. For a *Collocalia*, Waterfall Swift is atypically large. Brooke (1970) introduced *Hydrochous* as a subgenus name, merely on the basis of literature information (without seeing a specimen or live bird), but later raised the name to genus level, with Waterfall Swift *Hydrochous gigas* as its sole member (Brooke 1972). Brooke's rationale was (1) the larger size of Waterfall Swift compared to other *Collocalia*, (2) its lack of echolocation ability (Medway & Wells 1969) in contrast to *Aerodramus*, and (3) its peculiar nesting sites, near or behind waterfalls (Somadikarta 1968, Becking 1971). The species was tentatively placed by him in the tribe Collocaliini of the subfamily Apodinae, following the general division of the Collocaliini into three genera: (a) dull-plumaged echolocators (*Aerodramus*), (b) dull-plumaged non-echolocators (*Hydrochous*) and (c) dull or glossy plumaged non-echolocators (*Collocalia sensu stricto*) (Brooke 1970, 1972). This division needs revision, however, because *Collocalia troglodytes* of the Philippines has recently been proven to echolocate (Price *et al.* 2004).

To obtain insight into its phylogenetic relationships, Lee *et al.* (1996) compared mitochondrial cytochrome-*b* DNA sequences of *Hydrochous gigas* with those of several related species. The Maximum Likelihood Tree and the constructed Bootstrap Consensus Tree indicated that *H. gigas* is probably closely related to *Aerodramus*, although its precise phylogenetic position is uncertain because most parsimonious trees placed *Hydrochous* variously within *Aerodramus*, but never as a sister taxon to that genus. Thomassen *et al.* (2003) repeated the analysis but screened for a larger section of mitochondrial cytochrome-*b* DNA (i.e. 1143 bp, rather than 406 bp) in *H. gigas* and several allies. Their resulting Bootstrap Consensus Tree placed Waterfall Swift between two *Aerodramus* species, *A. maximus* and *A. fuciphagus*, but closer to *A. maximus*. The Maximum Likelihood Tree revealed the same topology, except that *H. gigas* now grouped with the single *A. vulcanorum* specimen examined.

Thus, the precise phylogenetic relationships of the Waterfall Swift remained somewhat uncertain. It is remarkable, however, that both research groups uncovered evidence of a close relationship between *Hydrochous* and the echolocating *Aerodramus* species: *Hydrochous gigas* has been shown to lack echolocation capacity by experimentally letting a specimen fly in a dark room (Medway & Wells

1969). In a recent publication, Price *et al.* (2005) performed another DNA analysis (cytochrome-*b* gene) of the same *Hydrochous gigas* specimen studied by Lee *et al.* (1996), which was collected by me and was examined by all of these authors without my knowledge or consent. Price *et al.* (2005) considered *Hydrochous* to be sister to the Three-toed Papuan Swiftlet *Aerodramus papuensis* (see Somadikarta 1967). Moreover they concluded that both *Hydrochous* and *A.papuensis* are sister to all other *Aerodramus* swiftlets. Hence, under this arrangement these two species are removed from amidst the *Aerodramus* and are placed as basal to them all.

My aim here is to describe the morphology and nestling plumages of Waterfall Swift in their various stages, as these might shed some light on the phylogeny of the species.

Methods

Observations

Most observations of Waterfall Swift nestlings were made at a site in western Java, at a relatively low waterfall (*c.*25 m) in the River Cicewol (06°46'S, 106°56'E), on the south slope of Mt Salak, at an altitude of *c.*1,100–1,200 m. Permanent observation of the nests at this site was impossible due to access difficulties and the problem of disturbance (see Part I). During brief nest inspections, the nestlings that could be reached were examined for size, the presence or absence of feathers (semiplumes) and development of feather tracts (pterylae). Weight was measured using a Pesola balance. Colour descriptions of the naked parts and feathers (semiplumes, etc.) were matched using Ridgway (1912) and Smithe (1974) colour swatches. Black-and-white and colour photographs were made for reference. Most observations were made in 1977–78, supplemented subsequently by further observations at the same site.

Because of the laborious work of constructing the stagings to reach the nests, nest inspections were usually repeated only 2–3 times after the first examination. Re-inspection was usually at an interval of 7–10 days, weather conditions permitting. Less-accessible nests were generally only visited once. Age estimations were therefore rather approximate, especially as the age of a chick when first found was not precisely known. Despite such shortcomings and the rather restricted number of visits, the approximate ages of the chicks were estimated reasonably precisely by comparing different chicks. Where possible, they were checked in following years and supplemented with additional information from other nesting sites.

Semiplume morphology

The 'pseudo-down' (semiplume covering) of Waterfall Swift nestlings was compared with that of Common Swift *Apus apus*. Feather structures were studied in detail at higher magnifications with the aid of a Wild M-5 stereomicroscope (enlargements 60–300×) and a Wild M-20 research microscope (300–600×), in unstained preparations in air, observed under cover glass. The semiplume of the

Common Swift nestling examined was from a bird found dead in a nestbox, at Bennekom, The Netherlands, containing two other, live nestlings. It weighed 14 g and had a wing-length of 38.3 mm, and was estimated to be *c.*14 days old.

Anatomical study

Because the course of the main arteries (carotid arteries) in the neck and thorax of Apodiformes (Apodidae) is important for a judgment on their phylogeny, these were studied in several alcohol specimens of *Hydrochous gigas* (Java) and *Collocalia linchi* (Java), and in fresh (frozen) specimens of *Apus apus* (Netherlands). Attention was also paid to the feet of *H. gigas*, i.e. the grip, and to the number of phalanges in the different digits, compared to those in other swift species.

Photographic records

As it was difficult to photograph the nestlings *in situ* on primitive ladders or scaffolds, the nestlings were briefly removed from the nests and photographed in a empty nest of the species at the foot of the fall, and afterwards immediately returned to their nests. The recently hatched young featured in Fig. 1 was found dead in its nest at another colony.

Results

Post-hatching development

Four different developmental stages of the nestling were recognised.

Newly hatched chick

As in all Apodidae, the hatchling is naked and blind (Figs. 1–2, two different chicks). A well-developed whitish egg tooth is conspicuous at the distal upper ridge of the upper mandible of the pinkish bill. The lower mandible protrudes somewhat beyond the upper mandible due to a second egg tooth-like structure or tubercle at the distal end of the lower mandible. This was pointed out to be a second egg tooth (C. T. Collins *in litt.* 2005). The skin is pinkish (Smithe: Salmon Color/Pink [6/7]; Ridgway: Pale Flesh Color (Pl. XIV)), with a very slight plumbeous or greyish tinge (Smithe: close to Light Neutral [85]; Ridgway: Light Varley's Gray [Pl. XLIX]). This greyish tinge is darker on the head, back and wings. The pinkish feet are soft and rather large for the size of the chick (Fig. 1). Newly hatched chicks weighed *c.*2–3 g and had a body length of *c.*3.5 cm. A large throat pouch is visible, an adaptation for taking food boluses. At this stage, the parents brood the chick continuously, and leave it only reluctantly if disturbed. The naked chick clearly requires nearly continuous parental cover for its insulation.

Chick of 4–8 days

At this age chicks are still completely naked and their eyes closed, but on the back slightly darker plumbeous feather tracts are visible below the epidermis, one dorsal (spinal tract) and one somewhat laterally on each side (femoral tract) (Fig. 3). In

Figure 1. Recently hatched Waterfall Swift *Hydrochous gigas* nestling (Jan-Hendrik Becking)

Figure 2. A few days-old nestling of Waterfall Swift *Hydrochous gigas* (Jan-Hendrik Becking)

addition, within the apteria many small dark spots appear (the underlying follicles of the down-like semiplumes). The coronal and occipital tracts of the body also become more prominent as dark grey (Smithe: Medium Neutral Gray, 84) areas or lines. The underside and anal region are still very pale greyish pink, and no underlying feather tracts are visible. Subsequently, the plumbeous grey back and head become darker (Smithe: Dark Neutral Gray/Medium Neutral Gray, 83/84), whilst the pinkish bill acquires a blackish tip and darker upper rim. The skin of the orbits of the protruding eyes also becomes darker, as does the skin of the tibia and femur and at the upper rim of the wing. The base of the broad bill, however, is pale flesh pinkish, even almost white. At this stage the skin does not cover the body smoothly but is rather wrinkled or folded, especially on the back and body-sides. The gape and palate are vivid flesh-pink, the tongue pinkish with a greyish tip. When 6–7 days old the chick is *c.*5 cm in length (head width 15.6 mm), but with its neck stretched—as when begging—can reach 6.5–7.0 cm. It weighs *c.*9.3 g, i.e. about 3–4 times its weight when newly hatched (2–3 g, *N*=5).

Chick of 10–15 days

A 'downy' semiplume covering sprouts on the back from the developed follicles visible earlier, giving the chick what looks like a coat of down (Fig. 4). The semiplumes sprout mainly from the apteria, but are often denser at its borders, and also develop on the head and upper chest. The chick starts to open its eyes, but if exposed to brighter sunlight immediately closes them. When handled the chick always tries to turn its head towards the shade. The growth of the covering is rather fast on the dorsal side, but far slower on the ventral side. The semiplumes are greyish black (Smithe: Dark Neutral Gray, near 83) and when fully grown measure *c.*10 mm. The first wing- and tail-feathers appear, still enclosed by their sheaths.

Chick of *c.*17–22 days

Although the semiplumes are still prominent, the growth of the primaries and secondaries, followed by the greater coverts, is rather rapid. As these feathers are still in sheath, the chick acquires a pin-cushion-like appearance, an image strengthened because the sheaths of the greater coverts and those of the carpal edge often point obliquely sideways from the wing (Fig. 5). Later, the secondaries and upperwing-coverts start to open their vanes at the tips, whilst the primaries are still enclosed within their sheaths.

There are indications that near the end of the 'downy' semiplume stage these semiplumes are very loosely implanted in the skin. A chick of this age found recently dead in a nest, which I tried to preserve as a specimen, lost most of its semiplumes during preparation, although I took utmost care to prevent this. The semiplumes which became detached during the skinning process were not still ensheathed, but full grown.

At a late stage the dense semiplumes become mixed with another type of unique feathers, which sprout from other follicles. They are more like normal contour

Figure 3. A 7–9-day-old nestling of Waterfall Swift *Hydrochous gigas* showing the somewhat contrasting darker pterylosis tracts regions on the back, and (in the upper left corner) the copious quantities of whitish gelatinous saliva used to bind the nest to the rock (Jan-Hendrik Becking)

Figure 4. A *c.*10–15-day-old nestling with semiplumes and its first contour feathers, the latter still in an early stage within their sheaths (Jan-Hendrik Becking)

feathers in having a loose-webbed base, followed by a short closed vane and ending in a more or less semiplume-like apex (Fig. 6d). The plumulaceous bases (of these new feathers) bear blackish-grey barbs identical to the initial semiplumes, but the closed vane is buffish yellow (Smithe: Cream Color, 54) and the grey semiplume-like endings have fine yellowish tips, affording the chick a somewhat variegated appearance, which is intensified when it raises its back feathers and appears bristly (Fig. 5).

A second wave of largely plumulaceous feathers arising from other follicles is exceptional and conflicts with any moult system known. Moreover, moult is described as a periodic shedding and replacement of feathers (Campbell & Lack 1985), and the follicles should persist and produce a series of feathers from each during the course of the bird's lifetime. This would mean that the downy semiplumes are overgrown by incoming contour feathers and thus disappear from sight, but are not lost or dropped. However, when I removed the contour feathers from an adult alcohol specimen of *H. gigas* I found very few 'downy feathers' below. This is a puzzle that requires solution. A second set of semiplumes is certainly very exceptional and unknown for any species of swift, but has been reported in other birds. It is unknown or disputed whether the moult pattern of contour feathers in birds can be applied for the semiplumes occuring in the apteria.

Figure 5. A *c.*17–20-day-old nestling showing the unique type of feathers (intermediate) between semiplumes and contour feathers. When these feathers are raised the nestling acquires a bristly appearance (Jan-Hendrik Becking)

It has been suggested that I had to examine the semiplume downy cover (and follicles) in the Waterfall Swift chicks more precisely, but this can not be done in a living chick without doing it severe harm. This can only be done in a dead chick, but I refrained from to sacrifice a chick for this purpose as the scope of this investigation was to follow its development[1].

Nestling of *c.*25–45 days

At this stage nestlings were rarely handled, because they were rather sensitive to disturbance. Moreover, they tended to grip with their feet very strongly to the underlying nest material and were therefore difficult to remove. The chicks at this stage are covered with sooty grey-brown contour feathers (Smithe: between Blackish Neutral Gray (82) and Dark Neutral Gray (83); Ridgway: Deep Slaty Brown, Plate L), paler on the underside and darker on the upperside, and with extensive white at their bases, particularly on the back, belly and flanks. Often this basal white is not completely concealed, giving the nestlings a somewhat spotted appearance. Completely white small underlying feathers can also be found on the back and belly, but apparently only very few semiplumes under these first contour feathers, as far as could be determined. It is noteworthy that Waterfall Swift nestlings at this age lack the pale greyish fringes to the primaries, secondaries and other contour feathers well known in older nestlings or juveniles of *Apus*, and also present in some Cypseloidinae (Marín & Stiles 1992). I estimate that nestlings leave the nest 48–55 days after hatching.

Description of the semiplumes

Unlike true natal down (neossoptiles), semiplumes are modified loose-webbed contour feathers (teleoptiles). Semiplumes have a definite rachis but no hamuli on the barbules, and therefore cannot produce a firm vane (Nitzsch 1840, Chandler 1916, Van Tyne & Berger 1971). The semiplumes of *Hydrochous gigas* are blackish grey (Smithe: Medium Neutral Gray/Dark Neutral Gray, near 84/83) and thus distinctly greyer than the uniform sooty-black (Smithe: Blackish Neutral Gray, 82) semiplumes of *Apus apus* studied for comparison.

As mentioned, there are two successive types of plumulaceous feathers. The first (Fig. 6a) develops from the naked chick. These are more or less spherical in form and usually *c.*6–10 mm long, occasionally 12.5 mm when fully grown. Smaller ones may also occur, 5–6 mm long. The semiplumes of *H. gigas* have no aftershaft at their base (Fig. 6a), unlike the semiplumes of *Apus apus*. At low magnification the

[1] From the observation that there are very few semiplume feathers in an adult it may be concluded that they are are lost and not replaced by new ones. It may be also that the dermal papilla at the base of the follicle is dormant for a time. I have the impression that the same sequence of processes, from 'downy cover' to juvenile and adult plumage, occurs in *Apus apus*. Through the courtesy of the Apus Working Group Netherlands, I have been given some chicks (found dead in the nest) and semi-adults and adults from Bird Shelters (mainly traffic victims), and with this material I hope to solve this plumage problem.

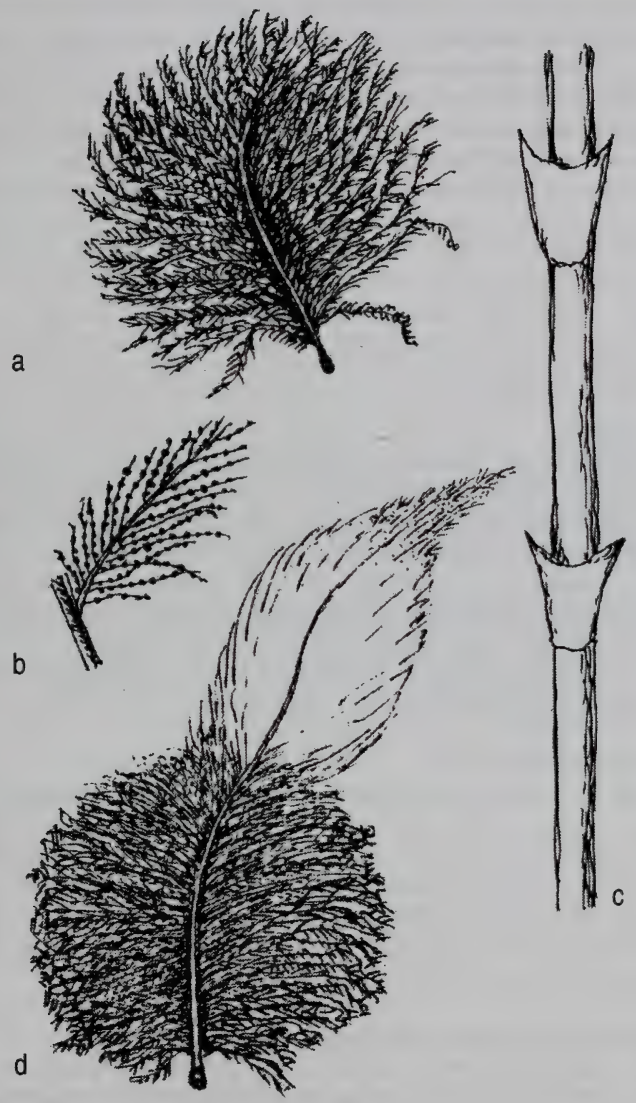

Figure 6. Drawings of semiplumes, etc. of Waterfall Swift *Hydrochous gigas*: (a) 'downy feather' (semiplume) of the first type; (b) a semiplume of the first type at low magnification, showing a chain of regularly spaced black dots (nodes) within the clear barbules; (c) a barbule of a semiplume of the first type at higher magnification, showing small thickenings (nodes or barbicels), which usually bear distally oriented spiny projections (prongs); and (d) a feather of the other unique type, being intermediate between a semiplume of the first type and a contour feather; it has a plumulaceous base followed by a short closed vane and ends in a fine semiplume-like apex (*del.* Jan-Hendrik Becking)

barbules of the semiplumes of Waterfall Swift appear transparent with a chain of regularly spaced black dots like a string of beads (Fig. 6b), whereas the barbules of *A. apus* are uniformly blackish without hyaline interspaces. At higher magnification (500–600×), the black dots in the barbules proved to be dark pigmented thickenings or projections, so-called nodes (Rosalind & Grubh 1987, Rajaram 2002). These are regularly spaced along the barbules with an internodal distance of *c.*9–10 μm. They are broadest towards the tip and usually have spiny projections, or 'prongs' (Fig. 6c).

The second type of feathers, being more like contour feathers, possess a partially closed vane and are about twice as long as the first type, *c.*18–19 mm, width 11–12 mm (Fig. 6d). When both types are observed closely with a magnifying glass or stereomicroscope, they are seen to have yellowish tips, a feature absent in the semiplumes of *Apus apus*.

Anatomical study

The Cypseloidine swifts, which in breeding in association with waterfalls and also in their size, are very similar to that of *Hydrochous gigas*. These Cypseloidine swifts have, however, two carotid arteries (Glenny 1953, 1955), as in most birds, which is supposed to be the primitive conditon. In *H. gigas* I found only one carotid artery in the laevo, i.e. sinistra, position connected to the heart, as in *Collocalia linchi* and *Apus apus*. The latter is regarded as the derived condition. In contrast to the feet of representatives of the genus *Apus* (Stresemann 1934), those of *H. gigas* are anisodactyl without any reduction of phalanges in the toes. This means its feet have 3, 4 and 5 phlanges for digits 2, 3 and 4, respectively.

Egg tooth development

The observed second egg tooth on the lower mandible of the Waterfall Swift is not unique to the species, having been found in other swifts. Collins & Naik (1975) described it for *Apus nipalensis*, of the subfamily Apodinae, in India. Moreover, it is reported (Collins 1968) for Short-tailed Swift *Chaetura brachyura* and Chestnut-collared Swift *Cypseloides rutilus* of the subfamily Cypseloidinae. Although of interest, the presence of two egg teeth in newly hatched *H. gigas* chicks throws no light on the phylogenetic relationships of Waterfall Swift.

Breeding biology compared to other swift species

Based on my observations, the breeding season of Waterfall Swift in western Java appears to last from September to January, sometimes until February/March (due to replacement clutches), coinciding with the rainy season, when termites, preferred food of Waterfall Swift, conduct mating flights and are readily available (pers. obs.). Termites were also found to be usually the sole prey in stomachs of this species examined by Max Bartels Snr. (notes held in the Leiden Museum). Moreover, the few stomaches (five), which I examined (in the rainy season) were distinctly enlarged and crammed with remains of termites. The estimated fledging period of

45–55 days is slightly shorter than that of the similar-sized and ecologically similar White-chinned Swift *Cypseloides cryptus* of the Neotropics (Marín & Stiles 1992, Chantler 1999). There is also a great similarity between the breeding biology of *Hydrochous gigas* and Cypseloidine swifts of the New World in respect of site preference, nest type and, for some species, even clutch size (single-egg clutches). *H. gigas* and Cypseloidine swifts are not, however, closely related, as fundamental differences exist between them (see above). The similarity is doubtless due to convergent evolution, resulting in their adaptation to the same very special nesting requirements.

Discussion

The discovery of a 'down-like' semiplume nestling plumage in *Hydrochous gigas* nestlings is surprising, as it is absent in all species considered its closest relatives, i.e. *Collocalia* and the echolocating *Aerodramus*. It is also lacking in the tribe Chaeturini (following Brooke 1970). Such plumage is, however, present in the subfamily Cypseloidinae of the New World, which also shows a great resemblance to Waterfall Swift in morphology, habits and nest-site choice, selecting sites close to running water or waterfalls, and construct similar types of nest (Becking 1971, Marín & Stiles 1992).

The semiplume covering of young nestlings of *Hydrochous* is probably an adaptation to its breeding in cool damp environments, assisting the insulation and thermoregulation of the chick, a view supported by some of my field observations. Newly hatched nestlings of Waterfall Swift were near-continuously brooded by one adult, but when the semiplume plumage was fully developed they were left unattended for shorter or longer periods. A similar suggestion regarding the function of down-like plumage was also made for Cypseloidine nestlings by Legg (1956) and Collins (1963).

The formation of a second plumulaceous covering, as reported for *H. gigas*, appears to be unique in swifts, but a second, successive coat of nestling down was first noted by W. E. Clark (1906) in penguins (for neossoptiles), and later recorded in most owls as well as certain other groups. These, however, are from the same follicle and are extruded on the incoming contour feathers (teleoptiles).

Environmental circumstances may not be the only explanation for the forming of a down-like covering. Of the two species of *Cypsiurus* palm swifts living under similar climatic conditions to each other, with the same life histories and nest-site choice, and building the same type of nests, the chicks of African Palm Swift *C. parvus* are densely covered with semiplumes (Schuster 1912, Moreau 1941, Collins 1965). Chicks of Asian Palm Swift *C. balasiensis*, however, are completely naked until the contour feathers appear (Hails & Turner 1984; pers. obs.). This suggests the presence of an essential genetic factor, playing a role in the growth (i.e. presence or absence) of semiplumes on chicks, in addition to environmental factors already mentioned.

Teleoptile semiplume plumage is also present in chicks of *Apus apus* and Alpine Swift *Tachymarptis melba*, which were originally cliff breeders in a cool climate (Glutz von Blotzheim & Bauer 1980, Cramp 1985). Unlike *Apus apus* and *Tachymarptis melba*, however, which have a so-called pamprodactyl foot (but see Collins 1983) with only three phalanges in digits 2–4 (Stresemann 1934), those of *H. gigas* are anisodactylous with no reduction in the phalanges (see above). The subfamily Cypseloidinae similarly have the normal avian anisodactylous condition, as does the enigmatic African genus *Schoutedenapus*. For precisely this reason, Scarce Swift *Schoutedenapus myoptilus* underwent a generic name change from its original *Apus myoptilis* (Salvadori 1888, De Roo 1963). There is a chronic lack of available data for *Schoutedenapus*: its breeding is unknown, and little is known of its behaviour and distribution either. The ignigmatic position of both *Schoutedenapus myoptilus* and *Hydrochous gigas* was reviewed by Collins (2000).

It is striking that the two *Cypseloides* with the same mass as Waterfall Swift (35.79 g, *N*=19, pers. obs.), namely *C. cryptus* (35.27 g, *N*=13) and *C. niger* (35.71 g, *N*=16), also lay only a single egg (Legg 1956, Marín & Stiles 1992). The much smaller *C. rutilus* (21.32 g, *N*=139) has a two-egg clutch (Collins 1968, Marín & Stiles 1992). There may be a relation between body mass and nesting behaviour in these species. A close relationship between Cypseloidine swifts and Waterfall Swift is unlikely, for several reasons. All Cypseloidine swifts have a diastataxic wing (H. L. Clark 1906, Stephan 1970) and two carotid arteries like most birds (Glenny 1953, 1955), whereas some Apodini (*Collocalia bartschi* and *Aeronautus andecolus*) have only one laevo-carotid artery (Glenny 1953, 1955). As mentioned, I found only one carotid artery, in the laevo, i.e. sinistra, position, in Waterfall Swift, *Collocalia linchi* and *Apus apus*. Moreover, Cypseloidine swifts possess no active salivary glands and therefore do not use saliva for nest building (Johnston 1961, Marín & Stiles 1992, Marin 1997). Waterfall Swift, however, uses copious saliva for nest attachment and some to bind the nest material, especially the rim. This saliva is originally white or opaque whitish gelatinous (see Fig. 3), but soon becomes black, particularly in older nests and especially in museum specimens. It is, therefore, frequently overlooked. A further difference is the use of mud for nest building: in Cypseloidine swifts it may comprise a considerable proportion (44–89%) of nest material (Marín & Stiles 1992), whereas this habit is entirely absent in Waterfall Swift (Becking 1971). Finally, there are some osteological differences, particularly in respect of the skull (Orr 1963).

Conclusions

The resemblance of Waterfall Swift to Cypseloidine swifts is probably due to convergence and related to their similar breeding habits. However, the formation of a second semiplume-like covering appears to be unique to Waterfall Swift. Conversely, differences in nestling plumage between Waterfall Swift and various *Collocalia* and *Aerodramus* species are probably due to differences in nesting habits, rather than large phylogenetic distance. It is unknown what phylogenetic

importance should be attached to the difference in echolocating capabilities between Waterfall Swift and various *Aerodramus* species. DNA studies of *H. gigas* and associated species to date have been inconclusive, and the precise taxonomic position of *H. gigas* remains to be determined.

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The birds of Satawan Atoll and the Mortlock Islands, Chuuk, including the first record of Tree Martin *Hirundo nigricans* in Micronesia

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The Mortlock Islands, a subgroup of the Caroline Islands and a part of the Federated States of Micronesia (FSM), are among the many small, remote, far-flung and seldom-visited islands of Oceania whose faunas are incompletely surveyed; ornithological records for the Mortlocks are especially scanty. The present study is based largely on observations by the author throughout the Mortlock Islands, but mainly on Satawan Atoll, during five separate visits between December 2002 and August 2004.

Previous studies

Kittlitz (1836) commented briefly on 11 species of birds observed on Lukunor Atoll in February 1828, during an expedition of the Russian research vessel *Senyavin*. Specimens from this expedition were deposited in the Russian Academy of Sciences in St Petersburg (Baker 1951, Hume 2001). Of landbirds recorded on the Mortlocks, the St Petersburg collection has only two specimens of Caroline Reed-warbler *Acrocephalus syrinx* that Kittlitz collected on Lukunor (V. Loskot *in litt.* 2005); whether seabirds were included in the collection was not determined at this time.

Johann Kubary, a naturalist and ethnographer employed at the Godeffroy Museum, Hamburg, Germany, visited the southern Mortlocks briefly in 1873 (Hezel 1979, Paszkowski 1971), and again in March to late May 1877 (Kubary 1880, Schmeltz & Krause 1881). No ornithological reports stem from the 1873 visit, which may have been only a brief stop en route from Palau to Pohnpei, but Schmeltz & Krause (1881) commented on 19 species seen by Kubary in 1877. Baker (1951) included these early records from the Mortlocks in his review of the avifauna of Micronesia, but no additional species were added to the group's avifauna by Baker.

Marshall (1971, 1975) recorded 23 species on Namoluk Atoll based largely on observations ancillary to his anthropological studies in 1969–71, which included records mentioned by Girschner (1912, 1913), a German physician who conducted anthropological research on Namoluk in *c.*1910 (Marshall 2004). Girschner used mainly local vernacular names that Marshall transposed into scientific nomenclature. Korte & Meltofte (1997) commented briefly on the status of some breeding seabirds in the Mortlocks, but provided no new records.

Remarks on place names

A confusing array of alternative place names for the Mortlock Islands, some obsolete, contributes to the difficulty in determining precise locations for some of the earlier records. The Mortlock Islands now refers to five atolls and one low coralline island south-east of Chuuk (=Truk) Lagoon (Fig. 1), but at the time of Kubary's visit, in 1877, it referred only to the three southernmost atolls—Ettal, Lukunor and Satawan (e.g. Rosser 1870, US Navy Hydrographic Office 1920). The name Lukunor is used for one of the islands on the atoll of the same name, and Satawan is the name of one of those within Satawan Atoll. Augmenting the confusion, Schmeltz & Krause (1881) reported Kubary's records under the heading 'Die Lukunorgruupe (Mortlock-Inseln)' referring, in this case, to all three closely juxtaposed southernmost atolls, and not solely to Lukunor Atoll. Baker (1951), however, reported these records as being from Lukunor or Mortlock. But the only

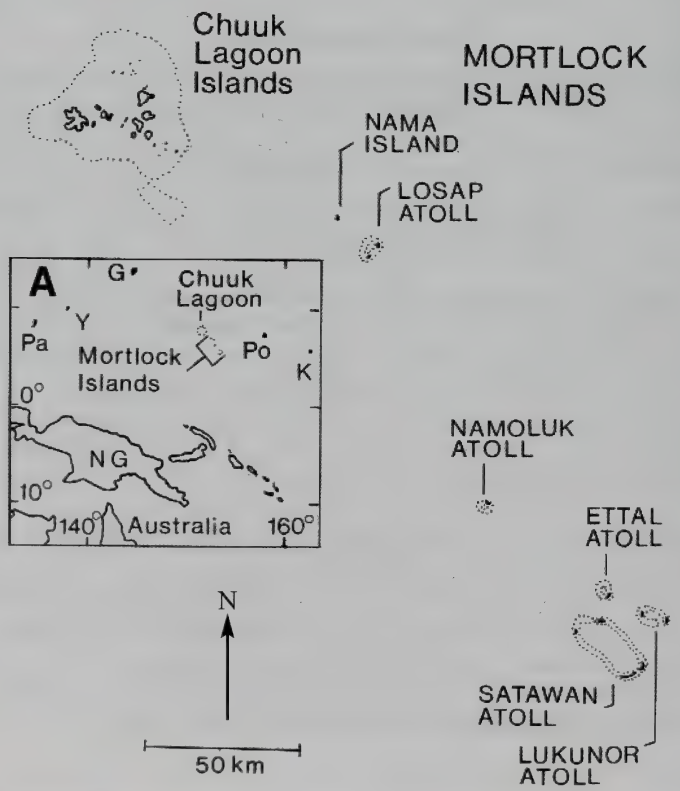

Figure 1. Location map for the Mortlock Islands. Inset: G = Guam, K = Kosrae, NG = New Guinea, Pa = Palau, Po = Pohnpei, Y = Yap.

islands specifically mentioned by Schmeltz & Krause (1881) with reference to Kubary in the Mortlocks are Ta and Uojta (=Weito), both on Satawan Atoll, and Westwood (1905: 81, 112) saw Kubary on Satawan Island in 1877. Also, in an anonymously written introduction to Kubary's (1880) ethnographic report on the inhabitants of the Mortlock Islands, the following statement appears: 'Kubary verweilte auf den Mortlock-Inseln während der Monate März biz Ende Mai 1877 und zwar speciell auf der Inseln Tä, Uoytä und Aliar' [Kubary visited the Mortlock Islands, particularly the islands Ta, Weito, and Aliar during the months of March through the end of May 1877.]. Additionally, Nason (1970) indicated that Kubary spent most of his time on Ta Island during his three months in the Mortlocks. In light of these reports, most if not all of Kubary's Mortlock records are likely to have been made on Satawan Atoll.

Study area

The Mortlocks (05°17'–07°N, 152°35'–153°50'E) comprise a chain of five atolls and one low, coral island spanning *c.*220 km in the west-central Pacific, from Nama Island, just south of Chuuk Lagoon, south-east to Satawan Atoll (Figs. 1–2). Total land area is *c.*12 km^2 distributed among more than 100 islands; Ta, the largest island, is 1.6 km^2. Maximum elevations are just *c.*3–5 m. The Mortlocks lie within the equatorial rainbelt and are sufficiently wet to support mesophytic vegetation (Mueller-Dombois & Fosberg 1998); the smaller islands lack a freshwater lens and are more xeric. Warm humid conditions persist throughout the year. On Namoluk, the mean monthly low temperature is 24–27°C, and the mean monthly high 30–36°C (Marshall 1975).

Coconut (*Cocos nucifera*) forest is the dominant vegetation type and breadfruit (*Artocarpus* spp.) is co-dominant in the interior of the larger islands. Other large, common forest trees include *Barringtonia asiatica*, *Ficus* spp., *Guettarda speciosa*, *Hernandia sonora*, *Neisosperma oppositifolia*, *Pandanus* spp. and *Terminalia samoensis*. The forest abuts the beach or merges abruptly with a narrow zone of coastal scrub or thicket dominated by *Tournefortia argentea* and *Scaevola taccada*. *Pemphis acidula* scrub is locally common in patches along the shore and mangroves are scarce throughout. There is no standing fresh water with the exception of excavated wells, some of which are simply crude holes dug to below the level of the freshwater lens. Some natural depressions, along with pits excavated for taro cultivation, hold water semi-permanently. Large, community-maintained taro patches occupy much of the interior on Nama, Namoluk, Kuttu, Moch and Lekinioch Islands.

Methods

Field work was conducted on Satawan Atoll on 17–26 December 2002, 7 July–1 August 2003, 30 March–9 April 2004, 22 June–6 July 2004 and 1–5 August 2004. The five other groups of islands were visited during summer 2004: Nama Island,

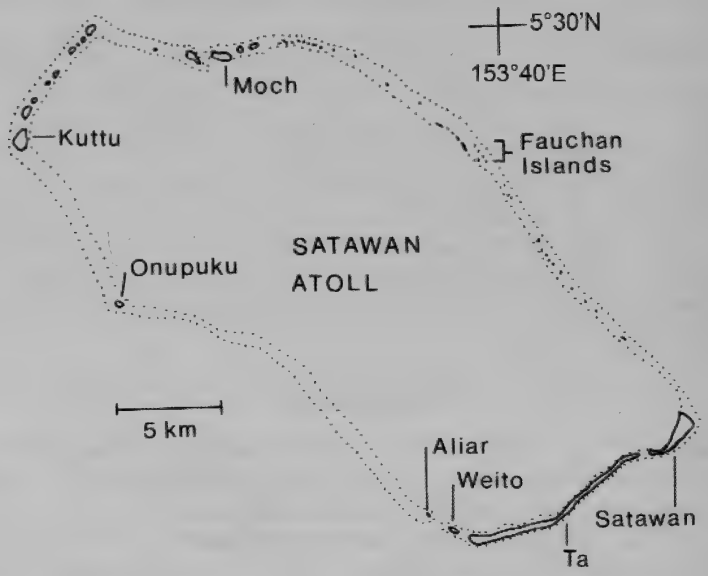

Figure 2. Location map for islands on Satawan Atoll, adapted from Bryan (1971).

7–14 July; Losap Atoll, 10 July; Namoluk Atoll, 19–29 July; Ettal Atoll 30 July–1 August; and Lukunor Atoll (Lekinioch Island only), 2–3 August. Landbirds were counted on 25 islands on Satawan Atoll between December 2002 and August 2004. The number of birds seen and heard calling were recorded during timed walks along pre-existing trails or by roughly following a compass bearing through the centre of the less frequently visited islands, usually along the long axis of the island, but occasionally at right angles to it. A single three-minute point count was applied on the smallest islands where complete coverage of the island was possible from one site. Each transect line or observation point was surveyed only once. An index of relative abundance for each species was calculated as the number of individuals encountered per hour. Shorebirds and seabirds were counted during walks along the beaches at or near low tide. On islands other than Satawan Atoll, birds were recorded irregularly and ancillary to reptile and fruit bat surveys; no transect or point counts were made, and the species lists, at least of migrants, are incomplete for these islands.

Terms of status and abundance are: common (more than 15 sightings per day), fairly common (approximately 5–15 sightings on most days), uncommon (usually fewer than five sightings per day and unrecorded on some days), scarce (observed occasionally and known only from few records, but not unexpected), resident (present year-round and breeding confirmed or very probable), migrant (present temporarily or sometimes throughout the year, breeding does not occur or is very

unlikely), occasional visitor (non-breeder of irregular and seldom occurrence, but not unexpected), vagrant (unexpected visitor and recorded only once or twice), and hypothetical (a record in need of corroboration or verification).

Scientific and English names and sequence of species follow Wiles (2005) where applicable. Some authorities include Tree Martin *Hirundo nigricans* in either the genus *Petrochelidon* or *Cecropis*. Hypothetical records are in square brackets.

Species accounts

[**PACIFIC BLACK DUCK** *Anas superciliosa*
Hypothetical. Girschner (1912, 1913) recorded a kind of wild duck [translation from German] on Namoluk Atoll. Marshall (1975: 11) stated 'ducks come singly or in pairs to the main taro swamp on Namoluk Islet, and that several different people reported having seen them at various times during the late 1960's [*sic*]' C. Severance (*in litt.* 2004) also recorded 'ducks' on Losap Atoll during the late 1960s and early 1970s. In none of these accounts is the species positively identified. Marshall (1971, 1975) included the Namoluk records under *A. poecilorhyncha* (= *superciliosa*) probably because of the proximity of Namoluk to the Chuuk Lagoon islands, where Pacific Black Duck is resident. However, inasmuch as five other species of ducks have been recorded as migrants on Chuuk and the high islands of Yap and Pohnpei that bracket Chuuk and the Mortlocks (Wiles 2005), the records of *A. superciliosa* in the Mortlocks require confirmation.]

RED JUNGLEFOWL (CHICKEN) *Gallus gallus*
Introduced. Free-ranging chickens occur on all the inhabited islands throughout the Mortlocks, usually around settlements, but occasionally in more remote areas. Less common on some of the uninhabited outlying islands. They were present during the earliest surveys. Kittlitz (1836) recorded chickens on Lukunor in 1828 and Kubary (*in* Schmeltz & Krause 1881) noted that *Gallus bankiva* (=*gallus*) inhabited the interior [probably on Ta or Satawan Islands], where it was rarely disturbed by the islanders who used the tail-feathers of roosters as a decoration for combs, but did not hunt it for food. In the Mortlocks, chickens are eaten only on special occasions and the eggs are very seldom eaten (Tolerton & Rauche 1949?, Marshall 1975, Severance 1976). The original sources of introduction are unknown, although Tolerton & Rauche (1949?) stated that chickens 'are said to have been brought [to Lukunor] from Truk in very early times,' and Marshall (1975) alluded to the introduction of Rhode Island Red stock to Namoluk by the Department of Agriculture on Truk.

WEDGE-TAILED SHEARWATER *Puffinus pacificus*
Occasional visitor? Encountered widely throughout Micronesia (Wiles 2005) and has apparently bred at unspecified localities in the Caroline Islands (Murphy & King *fide* Wiles 2005). Kubary (*in* Schmeltz & Krause 1881) recorded it in the southern

Mortlocks (probably at Satawan Atoll), and Marshall (1971, 1975) remarked on ten that arrived at Namoluk Atoll on 17 May 1971 at the same time as a ship from Chuuk. Marshall (1971, 1975) used the local name 'machukou' for this species, but Goodenough & Sugita (1980) indicate the name 'mechikow' (an orthographic variant?) may refer to Sooty Tern *Sterna fuscata*. On the other hand, the name 'sapal' that Marshall (1975) said referred to an unidentified species of seabird is similar to the Chuukese vernacular names 'sepal' (Nomwin Atoll) and 'hepal' (Pullap and Puluwat Atolls), which Davis (1999) indicated as possibly referable to *P. pacificus*.

WHITE-TAILED TROPICBIRD *Phaethon lepturus*
Scarce to uncommon resident. Recorded by Kubary (*in* Schmeltz & Krause 1881), presumably on Satawan Atoll, and by Girschner (1912) on Namoluk Atoll. Marshall (1975) estimated a population of no more than 50 individuals on Namoluk Atoll and recorded them nesting in breadfruit trees ('frequently in clumps of *Asplenium nidus*') on Amwes and Toinom islets. He added that tropicbirds are caught and eaten whenever possible. I saw none during this study.

BROWN BOOBY *Sula leucogaster*
Scarce to uncommon, probably breeding in small numbers. Resident breeder and widespread in Micronesia (Wiles 2005), but the only one I saw was on Onupuku on 9 July 2003. Marshall (1975) recorded *S. leucogaster* as an occasional visitor to Namoluk. He used the local vernacular name 'apwang' (='apwan' in Girschner 1913), but Davis (1999) indicated this is the name for Red-footed Booby *Sula sula*, whereas the name 'aamoo' or 'amo' refers to *S. leucogaster*.

RED-FOOTED BOOBY *Sula sula*
Locally common resident. I saw Red-footed Boobies frequently among feeding flocks of seabirds around Ettal, Satawan and Lukunor Atolls, and estimated 75–100 breeding pairs (some with eggs and young) on Onupuku Island, Satawan Atoll, on 9 July 2003. I observed a similar number breeding there on 31 March 2004 when I counted 60 active nests, including 29 with downy young, seven with nearly fledged young and three occupied by adults. Three immatures kept as pets in the settlement on Satawan Island in December 2002 were collected as nestlings on Onupuku. Unconfirmed reports of *S. sula* possibly breeding on Aliar Island, Satawan Atoll (Brandt 1962, Nelson 1978, Korte & Meltofte 1997), possibly are referable to Onukupu, which is not mentioned in these accounts. The only indications of seabirds breeding on Aliar (0.2 ha) that I saw in July 2004 were several disused nests of Black Noddies *Anous minutus* in a large *Pisonia* tree in the centre of the island.

GREAT FRIGATEBIRD *Fregata minor*
Uncommon to locally common resident. I observed *F. minor* occasionally throughout the year on Satawan Atoll, usually during periods of strong winds and

inclement weather, when small flocks of up to 15 soared on obstruction currents over the islands. I estimated 25–30 breeding pairs on Onupuku Island on 9 July 2003: three nests each containing single young ranging in age from a flightless downy nestling to fledged or nearly fledged birds with only tufts of down on the head and breast, with other (unexamined) nests higher in the canopy beyond reach, and some adults flushed from the crowns of coconut trees where additional nests may have been hidden from view. I observed a similar number breeding there on 31 March 2004 and recorded a nest with one egg, another with a downy young and five others each occupied by an adult. The nests were *c.*3–6 m above ground in *Tournefortia* trees. Other nests appeared to be in the tops of coconut trees but could not be seen clearly and verified.

INTERMEDIATE EGRET *Egretta intermedia*
Occasional visitor? Recorded as a migrant in Micronesia from Palau east to Chuuk (Wiles 2005). One I saw on Weito, Satawan Atoll, on 28 July 2003 is the first record for the Mortlock Islands. It was flushed several times from the marsh (an abandoned storm-damaged taro patch) that covers most of the interior of the island. Its larger size and slower, more forceful wingbeats distinguished it from the more common reef-egret.

PACIFIC REEF-EGRET *Egretta sacra*
Uncommon to fairly common resident. I encountered this species in small numbers, of 1–3 birds, regularly on beaches and reef flats throughout the Mortlocks. Of 27 on Satawan Atoll for which I recorded coloration, 13 were white, six were dark blue and eight were piebald. Marshall (1975) estimated no more than 25–30 on Namoluk Atoll, and mentioned only the white morph.

CATTLE EGRET *Bubulcus ibis*
Scarce migrant. A migrant to all major island groups of Micronesia (Wiles 2005). The two I observed on the Satawan Island school grounds on 17 December 2002 is the only record for the Mortlock Islands.

PACIFIC GOLDEN PLOVER *Pluvialis fulva*
Common migrant. I encountered *P. fulva* regularly on beaches and reef flats throughout the Mortlocks, usually in small numbers of up to 5–6 together. They were observed throughout the year, but less frequently in summer.

WANDERING TATTLER *Heteroscelus incanus* /
GREY-TAILED TATTLER *H. brevipes*
Uncommon to common migrants. Both species are recorded widely in Micronesia (Wiles 2005), and because they are difficult to distinguish in the field I treat them together. I observed tattlers on beaches throughout the Mortlocks, and usually no more than 2–3 together. Two were identified as *H. brevipes* by their bisyllabic calls;

many others had polysyllabic calls more characteristic of *H. incanus*. Kittlitz (1836) recorded *H. brevipes* on Lukunor Atoll. Kubary (*in* Schmeltz & Krause 1881) recorded *H. incanus*, probably on Satawan Atoll, and Marshall (1971, 1975) recorded it on Namoluk Atoll.

COMMON SANDPIPER *Actitis hypoleucos*
Uncommon migrant? Kubary (*in* Schmeltz & Krause 1881) recorded this species in the southern Mortlocks, presumably on Satawan Atoll, and Marshall (1971, 1975) observed it once on Namoluk Atoll; there are no other records for the Mortlocks. It has been recorded widely as a migrant in Micronesia, although Wiles (2005) considers records from Pohnpei and Kosrae, in the easternmost Carolines, to require confirmation because of the possible occurrence and confusion with the very similar Spotted Sandpiper *A. macularius* (Pyle & Engbring 1985, Wiles 2005).

WHIMBREL *Numenius phaeopus*
Uncommon to fairly common migrant. I observed Whimbrels occasionally on Satawan Atoll in April, June, July, August and December, with a max. 5 together at Ta airstrip on 4 August 2004. All those flushed at close range clearly had white on the rump characteristic of the north-east Asian subspecies *N. p. variegatus*. Marshall (1971, 1975) recorded this species on Namoluk Atoll.

BAR-TAILED GODWIT *Limosa lapponica*
Uncommon migrant. Kubary (*in* Schmeltz & Krause 1881) recorded *L. lapponica* (as *L. uropygialis*) in the southern Mortlocks, presumably on Satawan Atoll, and I saw singles on Ta Island, Satawan, on 7 April and 23 June 2004. There are no other records.

RUDDY TURNSTONE *Arenaria interpres*
Common migrant. I frequently encountered Ruddy Turnstones along rocky beaches, usually in small flocks of 2–5 (max. 20). It is one of the commonest shorebirds during migration and the absence of records from some islands is almost certainly an artefact of sampling; recorded previously in the Mortlocks on Namoluk Atoll (Marshall 1971) and Lukunor Atoll (Kittlitz (1836).

BUFF-BREASTED SANDPIPER *Tryngites subruficollis*
Vagrant or possibly scarce but regularly occurring migrant. A vagrant in Micronesia on Pohnpei and in the Marshall Islands (Wiles 2005). One that I observed foraging on the grass airstrip at Ta, Satawan Atoll over several days during the first week of April 2004 is the first record for Chuuk state. The distinctly buff-coloured plumage, yellowish legs and slightly smaller size readily distinguished it from several *Pluvialis* golden plovers foraging in the same area. Its small size and more uniformly buffy face and ventral region further distinguished it from Ruff

Philomachus pugnax, which is widespread during migration in Micronesia (Wiles 2005).

GREAT CRESTED TERN *Sterna bergii*
Uncommon to locally common resident. I observed *S. bergii* on Satawan Atoll occasionally, mainly in June and July. One young of the year (with a piece of orange yarn tied around one leg) on Manimwek Island on 20 July 2003 had a damaged wing and was unable to fly. I was told it was captured in the Fauchan Islands group (eastern side of the atoll) in March, when there were many flightless young on the beach. Kubary (*in* Schmeltz & Krause 1881) recorded this species, presumably on Satawan Atoll, in March–May 1877. Marshall (1975) estimated a population of no more than 50 birds on Namoluk Atoll and recorded some of them nesting on uninhabited islets.

BLACK-NAPED TERN *Sterna sumatrana*
Uncommon to fairly common resident. I encountered *S. sumatrana* regularly in small numbers throughout Satawan Atoll, mainly on sandy beaches and sandbars. Marshall (1975) estimated 50–100 on Namoluk Atoll, where they nested on sandbars and exposed reef outcroppings.

GREY-BACKED TERN *Sterna lunata*
Vagrant or occasional visitor. Breeds in Micronesia only in the Mariana Islands, but the species has been recorded in Palau, Yap and the Marshall Islands (Wiles 2005). One that I photographed (Fig. 3) on a sand and gravel bank on the east side of Satawan Atoll on 28 June 2004 is the first record for any of the eastern Caroline Islands (i.e. Chuuk, Pohnpei and Kosrae states), although Baker (1951) reported that W. Coultas obtained an immature male at sea south-east of Pohnpei in October 1930. The pale grey mantle of the Satawan bird distinguished it from the darker plumaged Bridled Tern *Sterna anaethetus*, which may also occur as a vagrant.

Figure 3. Grey-backed Tern *Sterna lunata*, Satawan Atoll, 28 June 2004 (D. W. Buden)

BROWN NODDY *Anous stolidus*
Common resident. I encountered *A. stolidus* frequently throughout the Mortlocks. Marshall (1975) considered it the most abundant bird on Namoluk Atoll, though I found it less numerous than *A. minutus*. The number of breeders is difficult to assess as the nests are usually hidden from view in the tops of coconut and *Pandanus* trees.

BLACK NODDY *Anous minutus*
Common resident and probably the most abundant bird in the Mortlocks. I frequently observed feeding flocks ranging in size from a few individuals to several hundred birds, usually just outside the reef-enclosed lagoons. On Satawan Atoll, in July 2003, I estimated *c.*100 breeding pairs on Onukupu Island, 200 pairs on Foui Island (north-east section of the atoll) and 40 pairs in each of two colonies on Ta Island. Smaller colonies of up to *c.*10 pairs were frequently encountered throughout the atoll. Nests usually were placed on the limbs of large broadleaf trees, mainly breadfruit and *Pisonia grandis*. I also frequently observed long, diffuse skeins of Black Noddies over Ta airstrip at sunrise, apparently departing their nocturnal roosts to feed at sea. I counted roughly 2,115, 2,365 and 2,245 during 05.20–06.40, 04.45–06.30 and 05.15–06.20 on 24, 25 and 26 June 2004, respectively; sunrise was at 05.35.

WHITE TERN *Gygis alba*
Uncommon to locally common resident. I frequently observed White Terns in small groups of 2–6 throughout the Mortlocks, usually as they flushed from roosting or presumed nesting sites in trees on many of the uninhabited islands and away from the villages on the inhabited ones. Marshall (1975) estimated 'well over 700' on Namoluk Atoll, and recorded *G. alba* nesting in breadfruit trees on the three largest islets.

MICRONESIAN PIGEON *Ducula oceanica*
Scarce resident, more numerous in the past. The only recent records are from Satawan Atoll, where I heard one calling at the eastern end of Ta on 24 December 2002, and another on Mariong Island on 11 July 2003. Kittlitz (1836) considered *D. oceanica* abundant on Lukunor Atoll, and Kubary (*in* Schmeltz & Krause, 1881) recorded it in the southern Mortlocks, presumably on Satawan Atoll, but gave no indication of abundance. Westwood (1905) remarked on shooting at least a dozen wild pigeons on an uninhabited island on Lukunor Atoll. Micronesian Pigeon probably was extirpated on Lukunor by about the 1940s. Tolerton & Rauche (1949?) stated 'some wild pigeons formerly existed but were killed off after acquisition of guns by the natives.' Girschner (1912, 1913) indicated *D. oceanica* was formerly present on Namoluk Atoll but extirpated by overhunting. The absence of records from Ettal Atoll and of any recent records from Lukunor possibly is an artefact of sampling. In view of the widespread distribution of *D.* oceanica in Micronesia (Kosrae, Pohnpei, Chuuk, Yap, Palau, Nauru, the Gilbert Islands [= Kiribati] and

Marshall Islands; Engbring *et al.* 1990), indicating an ability to cross long distances over water, it seems unlikely that the species would not disperse to Ettal and Lukunor from Satawan Atoll across water gaps of less than 10 km.

POHNPEI LORIKEET *Trichoglossus rubiginosus*
Probably introduced but never established; known only from an old record from Namoluk Atoll. Girschner (*in* Marshall 1971) claimed Pohnpei Lorikeet arrived on Namoluk during a typhoon in 1905. Marshall (1975) considered it an extinct breeder, presumably based on Girschner's report, but none of the islanders he interviewed in 1971 recalled ever seeing this species and there is no evidence it was ever established. Pyle & Engbring (1985) suggested the record is more likely based on the escape or release of caged birds brought from Pohnpei, where this species is endemic and occasionally kept as a pet.

LONG-TAILED CUCKOO *Urodynamys taitensis*
Scarce migrant. Marshall (1975) twice heard this species calling on Namoluk Atoll, and Kubary (*in* Schmeltz & Krause, 1881) recorded it, presumably on Satawan Atoll. Long-tailed Cuckoo breeds in New Zealand in the austral summer. It has been recorded as a vagrant or migrant in all of the major groups of islands in Micronesia (Wiles 2005).

MICRONESIAN HONEYEATER *Myzomela rubratra*
Common resident; the second-most numerous landbird species in the Mortlocks after Micronesian Starling *Aplonis opaca*. Encountered in all terrestrial habitats.

BARN SWALLOW *Hirundo rustica*
Uncommon migrant. Reported during migration on all the major island groups in Micronesia (Wiles 2005). I observed *H. rustica* in small numbers (several groups of *c.*4–6 birds) on Satawan Atoll in December 2000 and April 2004.

TREE MARTIN *Hirundo nigricans nigricans*
Vagrant. A female with small follicles collected at the south-west tip of Satawan Island on Satawan Atoll on 19 December 2002 is the first record for Micronesia. The bird was first observed the previous day hawking back and forth along the beach. It was captured in a mist-net set at right angles to the beach. The study skin is deposited at the Louisiana State University Museum of Natural Science, Baton Rouge (LSUMZ 172489). I saw no other swallows in the vicinity on either day. Tree Martin breeds in Australia, Tasmania and two of the Lesser Sundas, and possibly southern New Guinea (Coates & Bishop 1997). Migrants (including extralimitals) have been recorded as far north as Halmahera in the Moluccas (Buck *et al.* 1990) and east to New Guinea, the Bismarck Archipelago and the Solomons (Peckover & Filewood 1976), and New Caledonia (Barre & Bachy 2003). The wing-chord (unflattened, left 109.8 mm, right 109.1 mm) of the Satawan specimen falls well

within the range of the nominate (eastern Australian) subspecies (105–111 mm—Schodde & Mason 1999), but outside those of the western Australian subspecies *H. n. neglecta* (100–107 mm—Schodde & Mason 1999), and the Lesser Sunda Islands race *H. n. timoriensis* (90–94 mm—Turner & Rose 1989). The December date of the Satawan record is unusual for an austral migrant as it falls within the austral summer breeding season.

[UNIDENTIFIED HIRUNDINIDAE
Small groups of 5–10 swallows that I observed in flight on Ta and Satawan Islands in December 2002 and April 2004 were unidentified to species. They lacked white on the rump, thus eliminating Tree Martin. In having a slightly forked tail and seemingly no dark pigmentation on the upper breast they appeared less similar to Barn Swallow than to Pacific Swallow *H. tahitica*, which occurs in south-east Asia south to Australia, New Zealand and Melanesia, and east to the Society Islands in Polynesia (Howard & Moore 1994), but is unrecorded in Micronesia.]

CAROLINE REED-WARBLER *Acrocephalus syrinx*
Common resident. Recorded throughout the Mortlocks and frequently encountered in dense understorey and thickets. Marshall (1975) estimated 400–500 on Namoluk Atoll. Kubary (*in* Schmeltz & Krause 1881) recorded it nesting in March–May 1877, presumably on Satawan Atoll. I saw two nearly fledged young that a boy had removed from a nest on Ta Island, Satawan Atoll, on 7 July 2003.

MICRONESIAN STARLING *Aplonis opaca*
Common resident; the most common landbird on Satawan Atoll (Table 1), Namoluk Atoll (Marshall 1975), and elsewhere throughout the Mortlocks (pers. obs.). Marshall (1975) recorded it nesting on Namoluk Atoll, usually in *Pandanus* and coconut trees. On Satawan Atoll, I saw at least six different immatures in striped plumage soliciting food from adults in June 2004, and an islander informed me of the discovery of two unfledged young in a nest in the crown of a coconut tree on Manimwek Island on 18 July 2003.

[BLUE-FACED PARROTFINCH *Erythrura trichroa*
Hypothetical. Baker (1951) questionably recorded this species from Lukunor probably based on a statement by Schmeltz & Krause (1881) relating to Kubary's work in the Mortlocks: 'Ein versch lagenes Exemplar der *Erythrura trichroa* schuss K. einmal hier [Kubary once shot a specimen of *Erythrura trichroa* here].' But the location of any such specimen is unknown. *E. trichroa* occurs on the high Caroline Islands, including Palau, Chuuk, Pohnpei and Kosrae, but it is otherwise unknown from the atolls. The record from the Mortlocks (stated as Lukunor but probably Satawan) seems unlikely and requires confirmation.]

TABLE 1
Distribution of birds in the Mortlock Islands[a]

Species	Nama Island	Losap Atoll	Namoluk Atoll	Ettal Atoll	Lukunor Atoll	Satawan Atoll
[*Anas superciliosa*]			G/M			
Gallus gallus[I]	+	+	+/G/M	+	+/K	+/SK
*Puffinus pacificus**			M			SK
*Phaethon lepturus**			G/M			SK
*Sula leucogaster**			G(?)/M		K(?)	+
*Sula sula**			G(?)			+
*Fregata minor**			G/M			+/SK
Egretta intermedia						+
*Egretta sacra**		+	+/G/M	+	+/K	+/SK
Bubulcus ibis						+
Pluvialis fulva	+	+	+/G/M	+	+/K	+
Heteroscelus incanus	+(?)	+(?)	G(?)/M(?)			+/SK
Heteroscelus brevipes	+(?)	+(?)	G(?)/M(?)		K	+
Actitis hypoleucos			M			SK
Numenius phaeopus			G/M			+/SK
Limosa lapponica						+/SK
Arenaria interpres	+	+	+/G/M	+	K	+
Tryngites subruficollis						+
*Sterna bergii**			G/M			+/SK
*Sterna sumatrana**			G/M			+/SK
Sterna lunata						+
*Anous stolidus**	+	+	+/G/M	+	+/K	+/SK
*Anous minutus**	+	+	+/G/M	+	+	+/SK
*Gygis alba**			G/M		K	+/SK
*Ducula oceanica**			G		K	+/SK
Trichoglossus rubiginosus[I?]			G			
Urodynamys taitensis			M			SK
*Myzomela rubratra**	+	+	+/G/M	+	+	+
Hirundo rustica						+
Hirundo nigricans						+
*Acrocephalus syrinx**	+	+	+/G/M	+	+/K	+/SK
*Aplonis opaca**	+	+	+/G/M	+	+/K	+/SK
[*Erythrura trichroa*]						SK

[a] Sources: + = this study, G = Girschner (*in* Marshall 1975), K = Kittlitz (1836), M = Marshall (1975), SK = Kubary (*in* Schmeltz & Krause,1881).
Symbols and abbreviations: [ ] = hypothetical record; * = indigenous species recorded breeding in the Mortlocks or on one or more islands elsewhere in the Carolines; [I] = introduced.

Discussion

Of the 33 species of birds recorded from the Mortlock Islands (Table 1), and excluding the two introduced species and two hypothetical records, 15 breed locally

TABLE 2
Relative abundance of landbird species on Satawan Atoll based on surveys on 25 islands.

Species	Incidence[a]	Encounter rate (birds/h)[b] Inhabited islands[c]	Uninhabited islands[d]	X^2[e]	All islands
Ducula oceanica	1/25 (4%)	0	0.2 (1)	NA	0.1
Myzomela rubratra	25/25 (100%)	14.1 (49)	17.2 (75)	ns	15.8
Acrocephalus syrinx	24/25 (96%)	9.5 (33)	14.6 (64)	ns	12.4
Aplonis opaca	24/25 (96%)	22.4 (78)	26.1 (114)	ns	24.5

[a] The number of islands on which the species was recorded, divided by the total number of islands surveyed.

[b] The number of birds seen or heard per hour; total number in parentheses—see Methods.

[c] Four: Moch, 0.28 km^2, 50 minutes; Satawan, 1.1 km^2, 60 minutes; Ta, 1.6 km^2, 40 minutes; Kuttu, 0.28 km^2, 60 minutes.

[d] Twenty-one: total area *c.*1.1 km^2 (largest island 0.13 km^2), total survey time 262 minutes (4.37 hours).

[e] Comparisons between inhabited and uninhabited islands: NA = not available, insufficient data, ns = no significant difference ($P > 0.05$).

or have been recorded breeding elsewhere in the Caroline Islands; none is endemic. The 14 others are regularly occurring migrants or occasional visitors and vagrants. The indigenous avifauna includes 11 seabirds in the following orders: Procellariiformes (one shearwater), Pelecaniformes (two boobies, a frigatebird and a tropicbird), and Charadriiformes (six terns). All but one of the terns (*Sterna lunata*) breeds on one or more islands in the Carolines. The eight species of shorebirds recorded in the Mortlocks are all boreal migrants, and, with three egrets and a duck, complete the list of water or marsh birds. In view of the relatively large number of migrant shorebirds recorded on the major island groups elsewhere in the FSM (29 species—Wiles 2005), the number recorded in the Mortlocks is likely to increase markedly with additional surveys.

Onupuku, a small (0.05 km^2) island isolated on the west side of Satawan Atoll (Fig. 2), is an important seabird rookery in the Mortlocks. Satawan islanders consider it the principal bird island on the atoll. Onupuku is the chief breeding site for Red-footed Boobies in the Mortlocks (75–100 pairs); Great Frigatebirds, Brown Noddies, Black Noddies and White Terns also nest there. Onupuku is part of the Kuttu Island district and permission to visit must be obtained from a family on Kuttu. Some poaching of birds and coconut crabs occurs, but for the most part islanders are respectful of the restrictions, which are based on cultural tradition rather than formal Western legislation.

The four resident landbirds represent three feeding guilds, including a nearly extirpated frugivore, Micronesian Pigeon, apparently now confined to a small population on Satawan Atoll, another frugivore (Micronesian Starling), an insectivore (Caroline Reed-warbler) and a nectarivore (Micronesian Honeyeater). The honeyeater, reed-warbler and starling are abundant and widespread throughout the Mortlocks, and their encounter rates on Satawan Atoll showed no significant

differences between the larger, inhabited islands and the smaller, uninhabited ones (Table 2). The six other landbirds include introduced chickens, a probably introduced but apparently never established lorikeet, two migrants (Long-tailed Cuckoo and Barn Swallow), a vagrant (Tree Martin) and one hypothetical (Blue-faced Parrotfinch). Additional surveys will doubtless increase the number of migrants and occasional visitors, but the four resident landbirds undoubtedly are all that occur. This same resident species complex, or subsets thereof, is typically present on atolls throughout the eastern Caroline Islands (Baker 1951, Buden 1995, 1996a,b, 1998, 1999a,b), the one exception being Micronesian Kingfisher *Todiramphus cinnamominus* on Ant Atoll, off Pohnpei (Engbring *et al.* 1990, Buden 1996a).

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Notes on breeding, behaviour and distribution of some birds in Ecuador

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The avifauna of Ecuador is reasonably well known in terms of distribution and relative abundance (Ridgely & Greenfield 2001). Geographic patterns are rather well established (e.g. Fjeldså & Krabbe 1990, Ridgely & Greenfield 2001), but breeding biology data for most Neotropical species is poor, and available information general and incomplete. Quantitative and qualitative understanding of breeding biology and ecology is essential for the development of efforts to stop the ongoing loss of biodiversity. I present novel data on the breeding biology and distribution of 48 taxa, including several species considered rare or globally/nationally threatened by Ridgely & Greenfield (2001), Granizo *et al.* (2002) or BirdLife International (2004). Whilst my data are incomplete, the usefulness of such natural history observations is considerably augmented when combined with those of others, permitting us to establish country-wide patterns of reproductive biology and seasonality (Greeney *et al.* 2004).

Material and methods

Information presented herein was obtained between 1990 and 2005 at various localities in the Pacific lowlands, Andean highlands and Amazonian lowlands of Ecuador (Table 1, Fig. 1). Coordinates and elevations were confirmed using the physical map published by the Instituto Geográfico Militar in 2000. Taxonomy, English names and distributional information follow Remsen *et al.* (2006) and Ridgely & Greenfield (2001). I use the following abbreviations: (B) building, (I) incubating, (N) nestlings, (F) dependent fledglings, (AN) active nest at unknown stage, (J) juvenile-plumaged individual and (CM) carrying nesting material but nest unseen.

Species accounts

COMMON PIPING-GUAN *Aburria pipile*

I observed an adult with a chick under its wing, from a canopy tower *c.*30 m above ground, at Tiputini Biodiversity Station, in December 1997. Hilty & Brown (1986) reported females from Colombia in breeding condition in February and laying birds in May. My observation involved the taxon *cumanensis*, considered specifically, as Blue-throated Piping-guan *Aburria* (or *Pipile*) *cumanensis*, by Sibley & Monroe (1990), Rodner *et al.* (2000) and Grau *et al.* (2005).

TABLE 1
Localities mentioned in the text (see Fig. 1).

Loc #	Localities, provinces	Coordinates	Altitude (m)
1	Comuna Nueva Juventud, Sucumbíos	*c.*00°05'S, 76°12'W	*c.*290
2	Cuenca–Loja road, near Saraguro, Loja	*c.*03°36'S, 79°13'W	*c.*2,600
3	Cuicocha Lagoon, Imbabura	00°18'N, 78°22'W	3,100
4	Cumbayá, Pichincha	00°12'S, 78°25'W	2,390
5	Jipijapa–Puerto Lopez road, Manabí	*c.*01°24'S, 80°45'W	0
6	La Joya (Hacienda), Pichincha	00°05'N, 78°59'W	750–800
7	La Merced de Nono (Hacienda), Pichincha	*c.*00°02'S, 78°33'W	3,100–2,750
8	La Perla Protected Forest, Esmeraldas	00°01'N, 79°22'W	150
9	Malacatos, Loja	04°14'S, 79°17'W	*c.*1,500
10	Mashpi Protected Forest, Pichincha	00°09'N, 78°50'W	1,050
11	Río Guajalito Protected Forest, Pichincha	00°14'S, 78°49'W	1,900
12	Río Palenque Scientific Center, Los Ríos	00°35'S, 79°21'W	200
13	San Antonio de Pichincha–Perucho road, Pichincha	*c.*00°02'N, 78°25'W	*c.*2,200
14	Tandayapa, Pichincha	*c.*00°01'S, 78°46'W	*c.*1,700
15	Tinalandia, Pichincha	00°18'S, 79°03'W	740
16	Tiputini Biodiversity Station/ River, Orellana	00°39'S, 76°08'W	190–250
17	Vilcabamba, Loja	04°13'S, 79°15'W	1,600
18	Yuturi Lodge, Orellana	00°33'S, 76°05'W	200
19	Yanacocha, Pichincha	00°10'S, 78°35'W	3,400
20	Papallacta, Napo	00°22'S, 78°13'W	3,600
21	Quito (including Bosque Protector Pichincha and Parque Metropolitano de Quito), Pichincha	00°11'S, 78°29'W	2,800–3,000
22	La Toreadora Lagoon, Parque Nacional Cajas, Azuay	*c.*02°52'S, 79°13'W	3,600
23	La Ciénega (Hacienda), Cotopaxi	00°45'S, 78°40'W	3,000
24	Bosque Protector Pasochoa	00°27'S, 78°29'W	2,900

DARK-BACKED WOOD-QUAIL *Odontophorus melanonotus*

A pair with at least two dependent chicks at Mashpi Protected Forest (18 km north of San Miguel de Los Bancos) on 9 March 2003. When approached the adults fled and began calling vigorously, whilst the chicks quickly took cover under roots or amidst leaf litter, and froze. They were in secondary forest with a dense, tangled understorey and fairly open canopy on steep slopes. In March 2002, a pair with at least three dependent chicks was observed in a road cut covered by dense vegetation, *c.*15 km south (by road) from Río Guajalito Protected Forest. When approached, the entire group hid amidst vegetation. Strewe (2001) noted downy chicks in June 1997 and December 1997, and young in September 1997, January 1997 and January 1998 at La Planada, Colombia, and Greeney & Nunnery (2006) recorded juveniles in May from the Tandayapa area. These observations suggest year-round breeding in north-west Ecuador and south-west Colombia. *O. melanonotus* is classed as Vulnerable in Ecuador and globally (Granizo *et al.* 2002, BirdLife International 2004).

Figure 1. Map of Ecuador showing the study sites; numbers correspond to the localities in Table 1, except for Quito (locality 21) which is represented by a rectangle between localities 4 and 19 for clarity.

PIED-BILLED GREBE *Podilymbus podiceps*

At least six adults at Cuicocha Lagoon (00°18'N, 78°22'W; 3,100 m) on 17 November 2001, including a pair with downy young. Most birds were *c*.30–50 m from the dock of the lagoon, but the pair with chicks was near shore. The species breeds year-round: in Colombia, nests have been reported in January–March, egg-laying peaks in January–March and September–October, and pairs with downy chicks have been recorded in July–August (Hilty & Brown 1986, Fjeldså & Krabbe 1990).

MAGNIFICENT FRIGATEBIRD *Fregata magnificens*
In August 1995 and June 2000, birds were observed in courtship activity in the crowns of trees along the road between Jipijapa and Puerto Lopez. Haase (1997) reported that the courtship season in Ecuador usually commences in September; my records thus precede the normal breeding season by up to three months. However, in September 2005 no evidence of such activity was observed. Haase (1997) suggested that the early start in July 1997 of this species' courtship was influenced by the 1997 El Niño Southern Oscillation (ENSO), but my observations were made in non-El Niño years. Although variations on the courtship season of *F. magnificens* could be related to ENSO or to 'La Niña' (eastern tropical Pacific Ocean cooling), more data are needed to assess direct and indirect effects on the species' breeding biology.

AMERICAN KESTREL *Falco sparverius*
A resident pair at Cumbayá, Universidad San Francisco de Quito campus, constructed a nest within dense ivy on the wall of a building, *c.*12 m above ground. The pair was first observed frequently entering the nest in late July 2004. Chicks were heard in early September. Both sexes were apparently active at all stages of nesting, but nestling provision was by the male alone whilst the female always guarded the nest (similar observations have been reported for *F. rufigularis* by Sick 1993). Several times there were confrontations with Great Thrushes *Turdus fuscater* which attempted to enter the nest. Both sexes engaged in nest defence, but the male was more aggressive and followed the thrushes up to 75 m. The species nests on rock-ledges or in cavities, such as holes in trees, posts, cliffs, embankments or termite nests (Hilty & Brown 1986, Fjeldså & Krabbe 1990, Sick 1993). The ivy had a depth of *c.*15–20 cm and the nest was in a cavity formed by the foliage. Breeding in Ecuador has been reported in June and July (Fjeldså & Krabbe 1990).

ANDEAN / SLATE-COLOURED COOT *Fulica ardesiaca*
At least three nests under construction and another with one egg amongst floating vegetation at Cuicocha Lagoon on 17 November 2001. Breeding has been reported in late February in Nariño, Colombia (Hilty & Brown 1986). Fjeldså & Krabbe (1990) mentioned that egg-laying peaks in July–August, but that clutches may be initiated year-round.

BARN OWL *Tyto alba*
A fledgling at Hacienda La Ciénega, on 25–26 June 2005, amidst the leaves of a large palm tree, *c.*6 m above ground, and attended by one adult at night. Several egragopiles that were collected contained mainly hair and bones of *Mus musculus*, *Rattus rattus* and an unidentified rodent species. Ridgely & Greenfield (2001) reported *T. alba* as recorded mainly below 2,000 m, and that higher records perhaps correspond to wandering birds, citing just one record, from Hacienda La Ciénega. At least two *T. alba* used to live at Parque La Carolina, Quito, at 2,800 m. They were

apparently resident, being noted monthly in 1995–2004. A *T. alba* was periodically recorded at Parque Inglés, Quito, at *c.*3,000 m, and at least two periodically heard near Avenida Occidental, Quito, in 1994–2000. At least one *T. alba* was regularly recorded at Quebrada Ashintaco, Parque Metropolitano de Quito. These records indicate some highland populations of *T. alba* are resident as high as 3,000 m.

SAND-COLOURED NIGHTHAWK *Chordeiles rupestris*
An unsexed adult incubating two eggs at Tiputini Biodiversity Station, August 2000. The nest was a simple depression in the sand, *c.*5 m from the bank of the río Tiputini, almost beneath a broken log. The eggs resembled those described by Hilty & Brown (1986). Nests on sand bars have been reported in July–late September in the Leticia area of Colombia (Hilty & Brown 1986).

WHITE-TIPPED SWIFT *Aeronautes montivagus*
I found a colony beside the San Antonio de Pichincha–Perucho road on 1 October 1994, close to where Marín (1993) observed the species. The colony comprised *c.*40 birds and was located in a vertical road cut (*c.*50 m high). Several flying juveniles were seen at the entrances to nests, confirming breeding.

STRIPE-THROATED HERMIT *Phaethornis striigularis*
An adult feeding a juvenile in a forest gap with low ferns at Mashpi Protected Forest, 18 km north of San Miguel de Los Bancos, on 8 March 2003. The juvenile had the rump and back entirely rufous, unlike the adult, which has the back bronzy-green and the rump rufous.

LITTLE WOODSTAR *Chaetocercus bombus*
A pair observed at Tandayapa Lodge on 20 August 2003. The female was perched on an outer branch of an *Inga* tree whilst the male performed a courtship display consisting of perpendicular flights in front of the female together with high-pitched calls and wing-sounds. The maximum height of the flight above the female was *c.*5 m. This behaviour was observed for almost 20 minutes.

AMAZONIAN WHITE-TAILED TROGON *Trogon viridis*
An adult female excavating a hole in the lower part of an arboreal termite nest, *c.*40 m above ground, at Tiputini Biodiversity Station in July 1999. Due to the position of the nest entrance, I assume the nest was burrowed as depicted by Sick (1993: 353), i.e. the bird creates an upward-sloping tunnel to an incubation chamber in the centre of the nest. A male in breeding condition has been recorded in June in Colombia (Hilty & Brown 1986).

RED-HEADED BARBET *Eubucco bourcierii*
An adult male was carrying food to a cavity *c.*2.5 m high in a 5-m dead stump, in a gap within secondary forest, at Río Palenque Scientific Center, on 10 November 2004. Nestling calls were heard from within. A male Black-cheeked Woodpecker

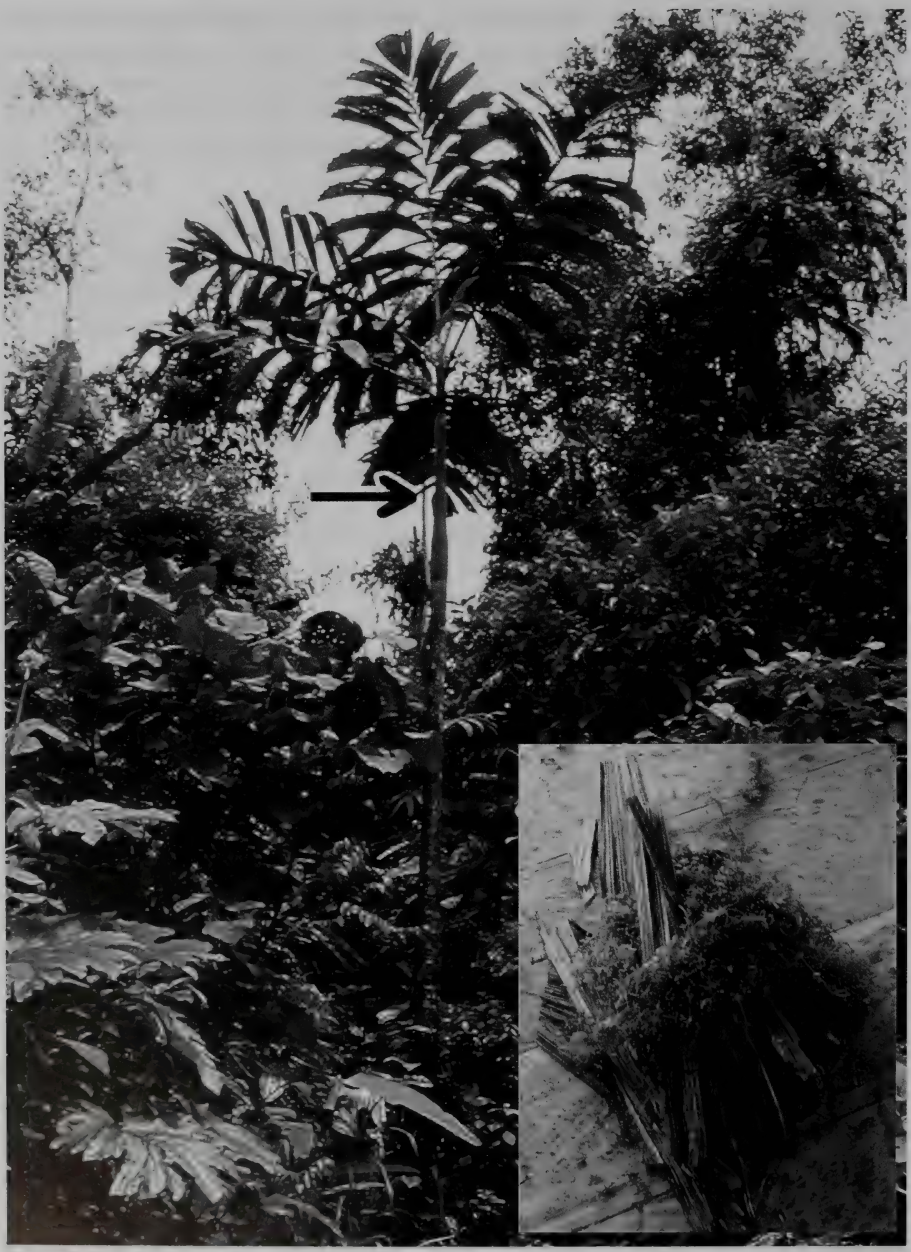

Figure 2. Palm with nest (lower right) of *Cranioleuca antisiensis*, Mashpi Protected Forest, Pichincha, Ecuador, 8 March 2003. The black arrow points to the leaf to which the nest was attached (Diego F. Cisneros-Heredia)

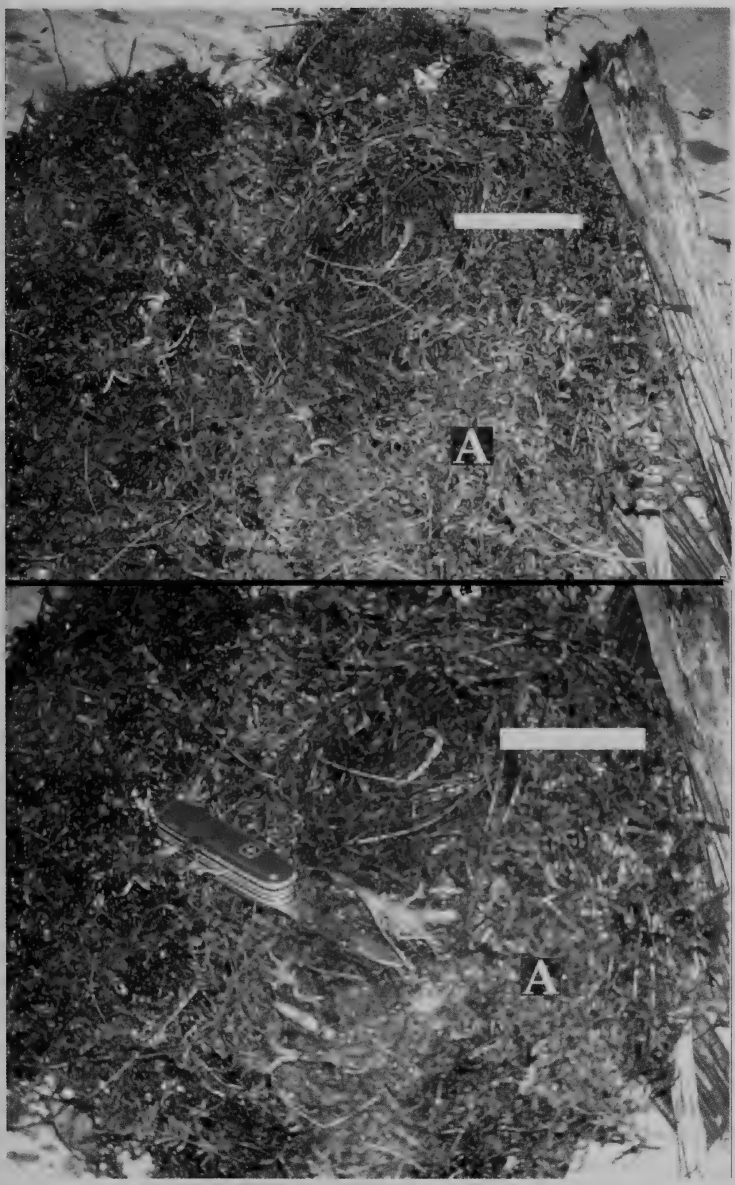

Figure 3. Cross-section of nest of *Cranioleuca antisiensis*, Mashpi Protected Forest, Pichincha, Ecuador, 8 March 2003 (Diego F. Cisneros-Heredia). A = Roof of brood chamber (top). White bar indicates nest entrance (bottom). The roof of the brood chamber is covered by brown hairy Bombacaceae seeds (lower photo).

Melanerpes pucherani was observed inspecting the same hole, *c.*1 hour prior to this observation, but no interactions were observed.

LINE-CHEEKED SPINETAIL *Cranioleuca antisiensis*
A pair of *Cranioleuca* carrying material to a nest at Mashpi Protected Forest, 18 km north of San Miguel de Los Bancos, on 8–9 February 2003. The nest was a bulky structure attached to the backside tip of a lower, outermost leaf of a palm, *c.*10 m above ground. The palm (*c.*15 m high) was surrounded by bushes on a hillside covered in foothill evergreen forest (Fig. 2). Following afternoon rain on 9 February 2003, both birds were carrying moss and palm fibres to the nest (repairing?). On 8 March 2003, the nest was abandoned and contained several fragments of broken eggshell (predation?). The nest coincides with Zyskowski & Prum's (1999) description for a pensile nest. It was a domed structure externally constructed of moss and strips of a cucurbitaceous vine, with palm fibres and dry Lauraceae leaves incorporated within the interior. The inner chamber was oval, wider than tall (height 10 cm, width 15 cm). The nest entrance was an 8-cm downward-sloping tunnel at the bottom of the nest. The brood chamber was lined with rootlets of an epiphyte (Ericaceae) and vines, and the dome covered with hairy seeds of a Bombacaceae (Fig. 3). The plumage of the nesting birds was typical of *C. antisiensis*, which in Ecuador is known only from the south-west: rufous crown, white supercilium and whitish throat, which characters differentiate it from juvenile Red-faced Spinetail *C. erythrops*. Previous reports from north-west Ecuador are regarded as uncertain due to the resemblance of *C. antisiensis* to juvenile *C. erythrops* (Ridgely & Greenfield 2001).

GOLDEN-FACED TYRANNULET *Zimmerius chrysops* /
YELLOW-BROWED TODY-FLYCATCHER *Todirostrum chrysocrotaphum*
A nest of each species was observed, from a canopy tower, in an emergent *Ceiba* sp., *c.*45 m above ground, at Tiputini Biodiversity Station in August 2000. The nests were just *c.*2 m apart and *c.*1 m from a paper wasp (Vespidae) nest. Only one adult was seen at the nest of *T. chrysocrotaphum*, but both at the nest of *Z. chrysops*. No interactions were observed between the two species. Similar observations for nests of *T. chrysocrotaphum* located near a wasp nest were reported by Greeney *et al.* (2004).

CHESTNUT-COLLARED SWALLOW *Petrochelidon rufocollaris*
A large colony (*c.*300 birds) nesting on a church in Malacatos on 31 December 2002. Numerous nests, at various stages of construction, were observed and photographed. Several birds were observed flying over Vilcabamba the same day. The species was not previously recorded from the Malacatos area and its presence supports the suggestion by Ridgely & Greenfield (2001) that the species is increasing.

WHITE-CAPPED DIPPER *Cinclus leucocephalus*
An active nest in a hole within a rock-wall dam of the río Guajalito, in late July–early August 1998, at Río Guajalito Protected Forest. Both sexes entered the nest several times per day, presumably feeding the single chick. The pair used the same nest location in two consecutive years in the same months, but in 1999 two chicks fledged. The pair disappeared in 2001, probably due to a petroleum spill and the release of hundreds of trout by the owner of a commercial open aquaculture, and there were no further observation until at least late 2003.

CASQUED OROPENDOLA *Clypicterus oseryi*
A colony of *c.*30 pairs was discovered high (*c.*30 m) in an emergent tree beside the río Tiputini, at Tiputini Biodiversity Station, in January 1998. In January 1999 the colony was smaller (*c.*15 pairs), but active, and remained so at least until January 2000. The colony was checked in the months of January–March, June–August, and December, and breeding activity noted in March, August and December.

LESSER GOLDFINCH *Carduelis psaltria*
A flock of 11 at Vilcabamba, on 30 December 2003, was photographed as they moved through the canopy of low *Acacia* trees and shrubs in a lodge garden near a ravine. The flock comprised adults of both sexes, and two dependent juveniles whose plumage corresponded to the description in Fjeldsa & Krabbe (1990). In Colombia, birds in breeding condition have been reported in May–October, eggs in May, July, December and January, fledglings in March, May and August, and juveniles in April, May and September (Hilty & Brown 1986, Fjeldså & Krabbe 1990). *C. psaltria* is very local and usually rare in the foothills and subtropical zone on both slopes of the Andes, with only one recent report from Pichincha province (Ridgely & Greenfield 2001). I have the following observations; six at La Merced de Nono, on the Nono–Calacali road, on 1 October 1994; three near Tandayapa on 13 November 1994; and a pair at the Rio Guajalito Protected Forest in August 1998. All observations involved birds foraging in the canopy of trees or tall shrubs.

ORANGE-BELLIED EUPHONIA *Euphonia xanthogaster*
A pair attending nestlings at Hacienda La Joya on 9–10 January 2002. The nest was a globular mossy ball (*c.*15 cm diameter) with a side entrance, as previously described for the species (Hilty & Brown 1986), at the end of a lone branch *c.*1.5 m above a fast-moving rivulet (*c.*6 m wide). Both adults were active dawn to dusk. The male never entered the nest, but was always close by (*c.*50 cm), occasionally vocalising. The female constantly returned at intervals of 0.25–2.0 hours, and remained within the nest for *c.*10–15-minute periods. The adults exhibited a complex behaviour when the female approached (observed more than 15 times on two consecutive days). The female arrived, always on branches higher or lower than the nest, and flew between different branches, from back to front and left to right,

for *c.*1 minute, before pausing at a branch posterior to the nest, whilst the male always perched over the nest. The female swiftly flew to the right, to the nest, whilst the male simultaneously performed an elliptical flight, intersecting with the female just in front of the nest, before returning to its perch. These movements seemed to represent anti-predator behaviour, using distracting movements when the female arrived and confounding it with male flight (a hypothesis also presented by Sargent 1993, who suggested that a mate-guarding component might be involved). The female was never seen carrying food, but both adults were mist-netted and the female regurgitated fruits and seeds, probably mistletoe berries. My observations were made with C. Dingle and G. Castañeda. Such behaviour has been described for several other *Euphonia* (Isler & Isler 1987, Sargent 1993). H. F. Greeney (*in litt.* 2005) has also noted similar behaviour in this species, and for Ochraceous Attila *Attila torridus* (Greeney 2006). *E. xanthogaster* in breeding condition have been reported in February–July and nests in November–April in Colombia (Hilty & Brown 1986).

Other records include: **Andean Guan** *Penelope montagnii*, 29 June 1996, 2 F, La Merced de Nono (with two adults in a forest remnant adjacent to cattle pasture). **Rufescent Tiger-heron** *Tigrisoma lineatum*, 17 July 2000, 1 J, Comuna Nueva Juventud (captured at night in a net placed for bats). **Andean Condor** *Vultur gryphus*, 23 July 1995, 1 J, Papallacta (with an adult male). **White Hawk** *Leucopternis albicollis*, 15 August 1996, 1 AN, Yuturi Lodge (large stick platform nest in crown of an emergent *Ceiba* sp. with one adult in attendance). **Eared Dove** *Zenaida auriculata*, 28 August 2005, 1 AN and 2 F on AN, Centro Cultural Metropolitano de Quito (females attending both nests on a palm tree leaf *c.*10 m above ground). 2 November 2005, 1 AN, Jardín Botánico de Quito (nest *c.*3 m above ground). **Blue-and-yellow Macaw** *Ara ararauna*, 16 August 1996, 1 AN, Yuturi Lodge (on a tall palm stump beside a river). **Hoatzin** *Opisthocomus hoazin*, May 2001, 1 N and 1 AN, Tiputini Biodiversity Station (beside an oxbow lake). **Great Potoo** *Nyctibius grandis*, 27 December 1999, 1 AN, Tiputini Biodiversity Station (nest in crown of an emergent *Ceiba* sp. beside the río Tiputini). **Rufous Potoo** *N. bracteatus*, 28 December 1999, 1 N, Tiputini Biodiversity Station (day roost and nest on stump in forest gap *c.*8 m above ground in lowland evergreen seasonally flooded forest). **Golden-headed Quetzal** *Pharomachrus auriceps*, 21 August 1999, 1 AN, Río Guajalito Protected Forest (female carrying food to hole in trunk *c.*10 m above ground). **Pacific Hornero** *Furnarius cinnamomeus*, 29 June 1996, 1 AN, Hacienda La Joya (nest *c.*25 m above ground). **Blackish Tapaculo** *Scytalopus latrans*, 20 August 1990, 1 J, Bosque Protector Pasochoa. **Tufted Tit-tyrant** *Anairetes parulus*, 9 August 1994, 1 J, Bosque Protector del Pichincha, Quito (mist-netted with two adults, juvenile had yellow rictus). **Tumbesian Tyrannulet** *Phaeomyias tumbezana*, 4 October 2004, 1 F, Universidad San Francisco de Quito, Cumbayá campus (in bushes beside artificial lagoon). **White-tailed Shrike-tyrant** *Agriornis andicola*, 28 December 2002, CM, Cuenca–Loja road, near Saraguro,

Loja (in cattle pasture surrounded by low bushes, pine and eucalyptus). **Masked Water-tyrant** *Fluvicola nengeta*, July 1998, 1 AN, La Perla Protected Forest (adult attending globular nest, 5 m above ground in a 3-m tall bush in a field adjacent to cattle pasture). **Black-crowned Tityra** *Tityra inquisitor*, CM (7 January 1995), AN (until April 1995), Hacienda La Joya (pair with nest in a hole atop a *c.*15 m stump in cattle pasture less than 10 m from a forest fragment). **White-thighed Swallow** *Neochelidon tibialis*, 8 March 2003, 3 F, Mashpi Protected Forest (flock of *c.*15 with two Southern Rough-winged Swallow *Stelgidopteryx ruficollis*). **Great Thrush** *Turdus fuscater*, 2 November 2005, 2 CM, Termas de Papallacta. **Hooded Mountain-tanager** *Buthraupis montana*, 22 June 2005, 2 F, Yanacocha (in subcanopy and understorey as part of a mixed flock). **Cinereous Conebill** *Conirostrum cinereum*, 30 November 2005, 1 CM, Jardín Botánico de Quito. **Tit-like Dacnis** *Xenodacnis parina*, 15 August 1999, F and J, La Toreadora Lagoon (with adults in *Polylepis*/*Gynoxys* forest). **Glossy Flowerpiercer** *Diglossa lafresnayii*, 22 June 2005, 2 F and 1 J, Yanacocha (with adults at hummingbird feeders). **Saffron Finch** *Sicalis flaveola*, 30 December 2003, AN, Vilcabamba (pair occupying abandoned *Furnarius cinnamomeus* nest, *c.*8 m above ground). **Yellow-breasted / Rufous-naped Brush-finch** *Atlapetes latinuchus*, 20 August 1990, 1 I, Bosque Protector Pasochoa. **Russet-crowned Warbler** *Basileuterus coronatus*, 20 August 1990, 1 AN, Bosque Protector Pasochoa. **Hooded Siskin** *Carduelis magellanica*, 8 August 1994, 2 J, Bosque Protector del Pichincha, Quito (mist-netted with an adult female, juveniles had red rictus).

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